UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA, GEORGIA 30303-8960

JAN 16 2001

4WD-SSMB

MEMORANDUM

SUBJECT: Florida Steel NPL Site
Indiantown, Florida
Five-Year Review

FROM: Randy Bryant, Remedial Project Manager RCB
South Site Management Branch

THRU: Curt Fehn, Chief CF
South Site Management Branch

TO: Russell L. Wright, Acting Director
Waste Management Division

Attached please find the Five-Year Review report for the Florida Steel NPL site in Indiantown, Florida. Section 121(c) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended, requires that if a remedial action is taken that results in any hazardous substances, pollutants, or contaminants remaining at the site, the Environmental Protection Agency (EPA) shall review the remedial action no less often than each five years after initiation of the remedial action to assure that the implemented remedy remains protective of human health and the environment.

The Site, approximately 150 acres in size, was the location of a steel mill which recycled scrap metal into steel reinforcement bars. Some of the soil on-site was contaminated with cadmium, lead, zinc and polychlorinated biphenyls (PCBs). Lead and zinc were also found in the sediment of an adjacent wetland. Groundwater is contaminated with sodium and radium. The Site was divided into two operable units to facilitate remediation. Operable Unit One focused on contaminated soil. The remedy included excavation and solidification of approximately 75,000 tons of soil with disposal in an on-site double lined landfill. Operable Unit Two focused on wetland sediment and groundwater. The remedy included excavation of the most highly contaminated wetland sediment with disposal on-site in either the landfill or upland areas, where appropriate, and restoration of the wetland. Contaminated groundwater is withdrawn, blended with clean water to meet drinking water standards, and discharged to an on-site sprayfield.

After review of the remedial objectives for OU-1 and OU-2 and the completed remediation, we have determined that the remedy remains protective of human health and the environment. O& M activities are being conducted as outlined in the O&M plans. While the remedy remains protective, two deficiencies were noted in the five year review. Warnings signs were not present on the fence around the Site and groundwater ARARs have not yet been met. Signage will be addressed by the property owner. Given that this is a long term groundwater remedy, groundwater ARARs will be satisfied at the conclusion of the groundwater cleanup.

EPA makes the following recommendation for actions that should be taken between this and the next five-year review due; in January 2005:

- Continue groundwater remediation until the Federal and State MCLs are met for sodium and radium.

- Continue the O&M activities associated with the on-site landfill and site access control.

- Attachment of this memorandum to the report which presents the data for the five year review for the Florida Steel NPL Site. The report which is titled Five-Year Review: Florida Steel Corporation NPL Site, was prepared by the Army Corps of Engineers in December 2000.

Attachment

EPA Five-Year Review Signature Cover

Preliminary Information

Site name: Ameristeel Indiantown Site		EPA ID: **FLD050432251**
Region: **04**	State: **Florida**	City/County: **Indiantown, Martin County**
LTRA* (highlight): Y **N**		Construction completion date: **OU-1 - May 1996** **OU-2 – February 1997**
Fund/PRP Lead: **PRP**		NPL status: **Final**
Lead agency: **EPA, Region 4**		
Who conducted the review (EPA Region, state, Federal agencies or contractor): **US Army Corps of Engineers, Jacksonville District & Mobile District**		
Dates review conducted: From: **5/01100** To: **7/01/00**		Date(s) of site visit: **4/27/00**
Whether first or successive review: **First Review'**		
Circle: **Statutory** Policy		Due date: **January 2000**
Trigger for this review (name and date): **Initiation of Remedial Action OU-1, January 1995**		
Recycling, reuse, redevelopment site (highlight): **N**		

Deficiencies:

Several minor deficiencies were identified. See Section VII: Deficiencies.

Recommendations:

Recommendations addressing the deficiencies are provided in Section VIII: Recommendations.

Protectiveness Statements(s):

The selected remedy, as executed, currently remains protective of human health and the environment. Continued site inspections and groundwater monitoring should be conducted to ensure long-term protectiveness.

Other Comments:

None.

Signature of EPA Regional Administrator or Division Director, and Date

1/16/01

Signature **Date**

Name and Title Russell L. Wright

Acting Director

Waste Management Division

AmeriSteel Indiantown Mill
Formerly known as
Florida Steel Corporation
Indiantown, Martin County, Florida
Superfund Five-Year Review Report

List of Figures, Tables, Photographs & Attachments

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List of Abbreviations

ARAR	Applicable, or Relevant and Appropriate Requirements
COC	Contaminant of Concern
CERCLA	Comprehensive Environmental, Response, Compensation and Liability Act
EPA	Environmental Protection Agency – Region IV
ESD	Explanation of Significant Differences
FDEP	Florida Department of Environmental Protection
FDER	Florida Department of Environmental Regulation
FS	Feasibility Study
FSC	Florida Steel Corporation
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NGVD	National Geodetic Vertical Datum
OU-1	Operable Unit One
OU-2	Operable Unit Two
PCB's	Polychlorinated Biphenyls
POTW	Publicly Owned Treatment Works
RA	Remedial Action
RD	Remedial Design
RI	Remedial Investigation
ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization Act
TCLP	Toxicity Characteristic Leaching Procedure
USACE	United States Army Corps of Engineers

AmeriSteel Indiantown Mill
formerly known as
Florida Steel Corporation
Indiantown, Martin County, Florida
Superfund Five-Year Review Report

I. Introduction and Purpose

General

The U.S. Army Corps of Engineers, Jacksonville District (USACE), on behalf of the U.S. Environmental Protection Agency (EPA), Region 4, has conducted a Five-Year Review of the remedial action implemented at the AmeriSteel Indiantown Mill formerly known as Florida Steel Corporation (FSC), Indiantown, Martin County, Florida. This report documents the results of that review. The purpose of this Five-Year Review is to determine whether the remedial actions at the FSC site remain protective of human health and the environment. The methods, findings, and conclusions of the review are documented in this report.

Authority

This review is required by statute. Section 121 of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and Section 300.430 (f) (4) (ii) of the National Oil and Hazardous Substance Contingency Plan (NCP), require that periodic (no less often than every five years) reviews be conducted for sites where hazardous substances, pollutants or contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure following the completion of remedial action.

This is the first five-year review for the FSC site. The trigger for this statutory review was the initiation of remedial action (RA) at the site, signified by the actual RA start date shown in EPA's CERCLIS/WasteLAN database, January 1995. The actual due date of the first Five-Year Review is January 2000. All remedies for the Southwest Wetland and the on-site contaminated soil and sediments have been completed. Construction of the on-site vault to contain the excavated waste was also completed. The only on-going remedial action at the site involves remediation of the groundwater plume.

Local Repository

A copy of this 5-Year Review Report will be placed in the EPA Region IV Record Center in Atlanta, GA, as well as the local information repository for the FSC site. The location of the local information repository is:

Indiantown Public Library
302 West McLendon St.
Indiantown, Florida 33566
(561) 597-4200

II. Site Background

The background information presented in this section is a summary and synthesis of material contained in the Record of Decision (ROD) as well as numerous other reports, both pre-remedial and post-remedial. It is not the purpose of this section to present a detailed description of the site background, since this has already been accomplished in other reports (see Appendix A).

A. Site Description

Location

The FSC Indiantown Mill is located in Martin County, Florida. It is located south of Highway 710 and approximately 2 miles northwest of the community of Indiantown. The Site is also approximately two miles northeast of the St. Lucie Canal and is located within the Indian River Lagoon Drainage Basin System. The Site covers approximately 150 acres.

The Site occupies most of the northern ½ and a portion of the southeastern ¼ of Section 35, Township 39 South, Range 38 East. The Site is located about 25 miles west of Stuart, the county seat, and 40 miles northwest of the City of West Palm Beach.

At present, adjacent properties include:

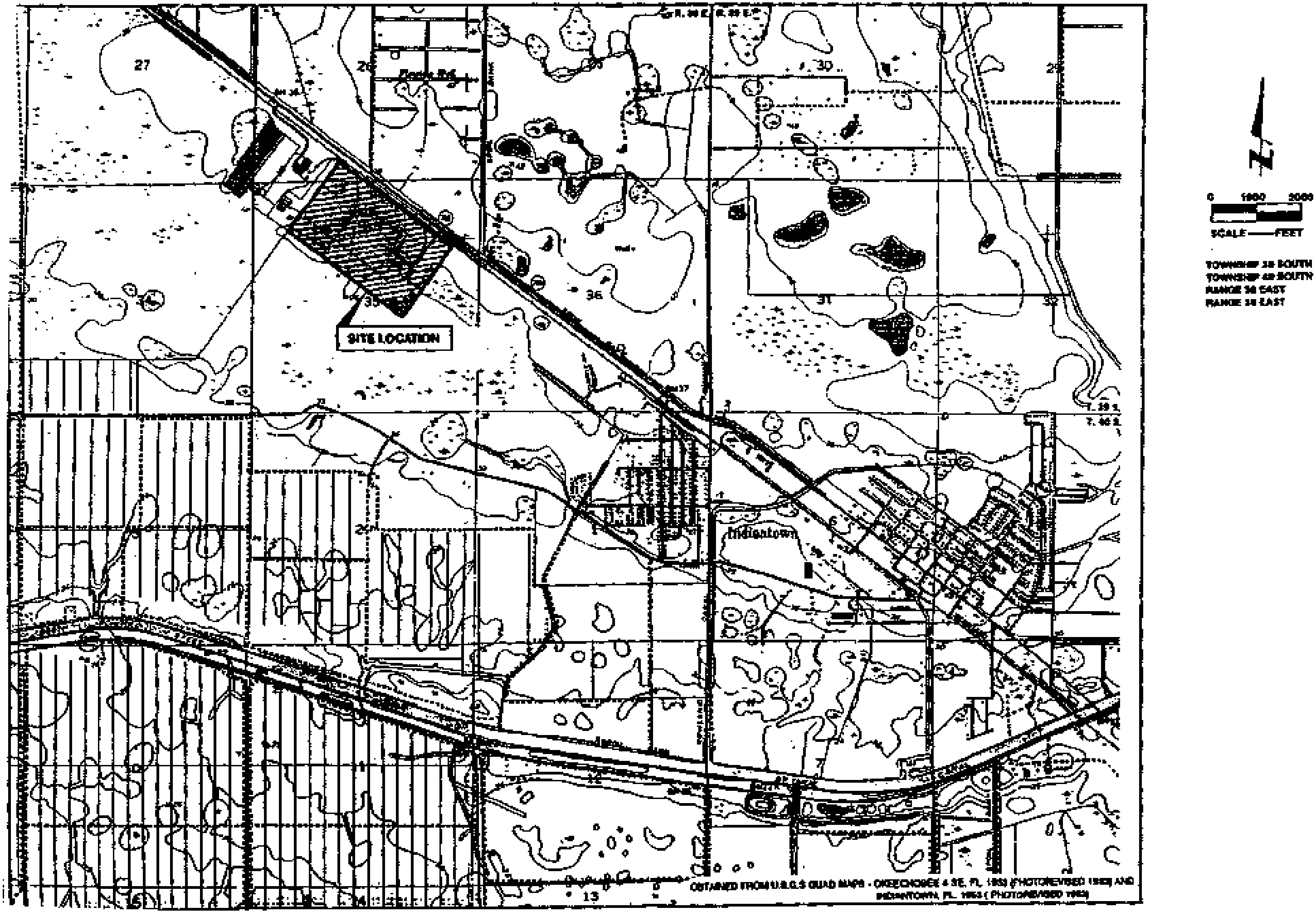
- North – Seaboard Coast Line (CSX) railroad and State Highway 710;
- South – Undeveloped land;
- East – Undeveloped land;
- West – Martin County Power Plant

A Site Location Map is presented as Figure 1.

Site Layout/Land Use

The site was undeveloped prior to its acquisition by FSC in 1969 and consisted mostly of brushland with some swampy areas.

The Florida Steel property and the extensive areas to the east, south and west are zoned for industrial uses. The industrially-zoned lands immediately west of the site are in active use by industrial facilities and a 300-megawatt coal-fired electric generating plant is located immediately southwest of the site. The



Site Location Map
Figure 1

industrially zoned lands to the south and east of the site contain a number of wetlands. The uplands in those areas are currently undeveloped.

A main line rail track abuts and parallels the northerly boundary of the FSC property, as does Highway 710. The area north of the main line rail track and Highway 710 is zoned agricultural. This area includes a number of wetlands. The uplands in this area are currently used for agricultural purposes. A 250,000-volt transmission line runs parallel to the southern boundary of the site at a distance of about 200 feet. Another 500,000-volt transmission line runs across the western portion of the site.

The site has been substantially disturbed by its use as a steel mill. The only on-site water bodies are small man-made borrow pits and drainage ditches which are both undistinguished and unsuitable for fishing.

At present, visible site features include:

- Former mill building;
- On-Site containment system (vault);
- Southwest wetlands (off-site);
- Treatment plant;
- Spray fields
- Wells

Residential and recreational uses of the site have been precluded by restrictive covenants recorded in land title records under which residential and recreational uses are prohibited and only industrial, public utility and commercial uses are permissible.

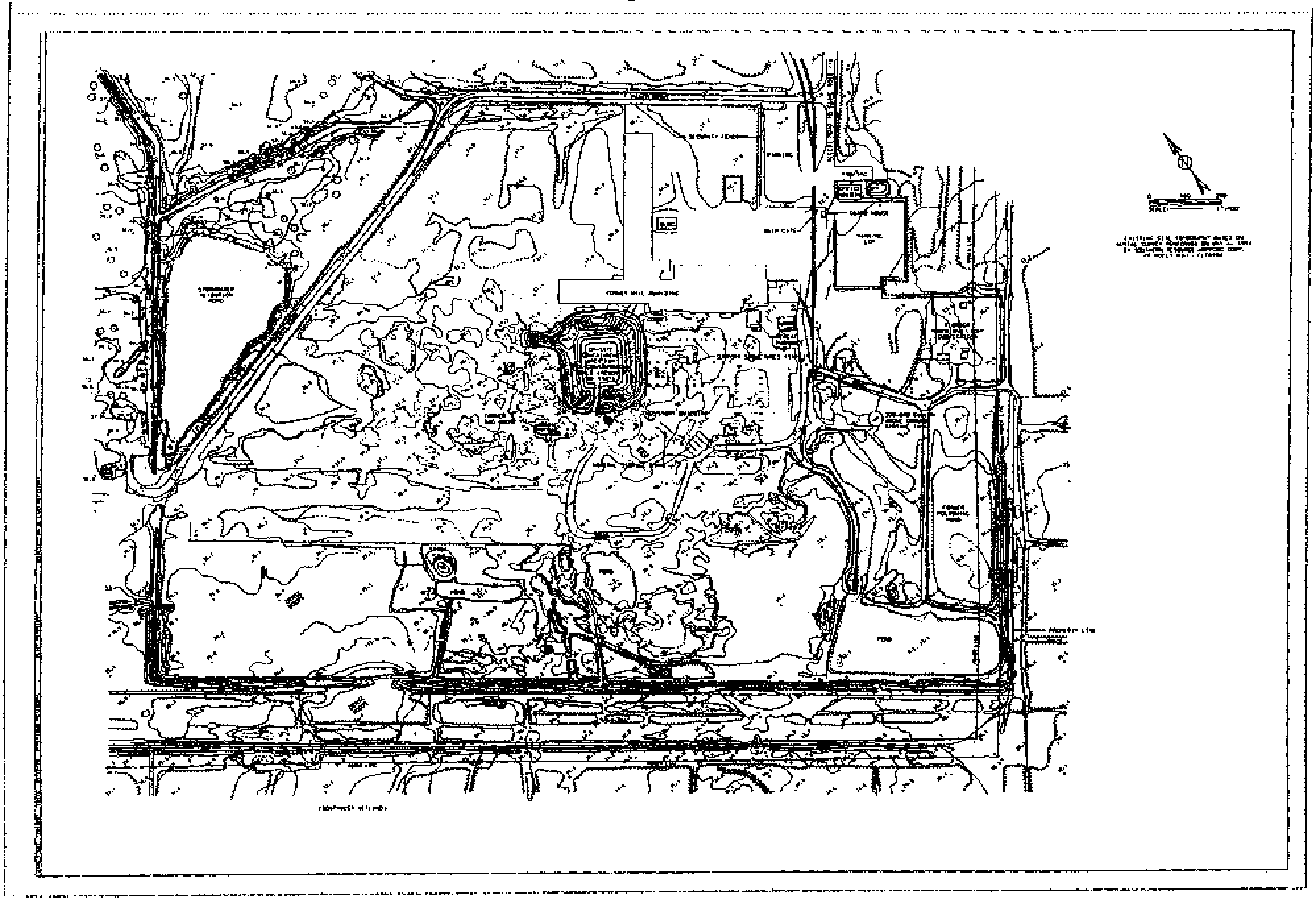
A Pre-Remediation Site Layout map, which is representative of pre-remediation site conditions as presented as Figure 2. The remediation time frame for OU-1 (soil remediation) was from January 1995 to May 1996. Installation of the groundwater remediation system under OU-2 (Southwest Wetland and groundwater remediation) was completed in February 1997. Remediation of the groundwater plume is ongoing. Restoration of the Southwest Wetland, which was administered under OU-2, began in July 1995 and was completed in December 1995.

A Post-Remediation Site Layout map is presented as Figure 3.

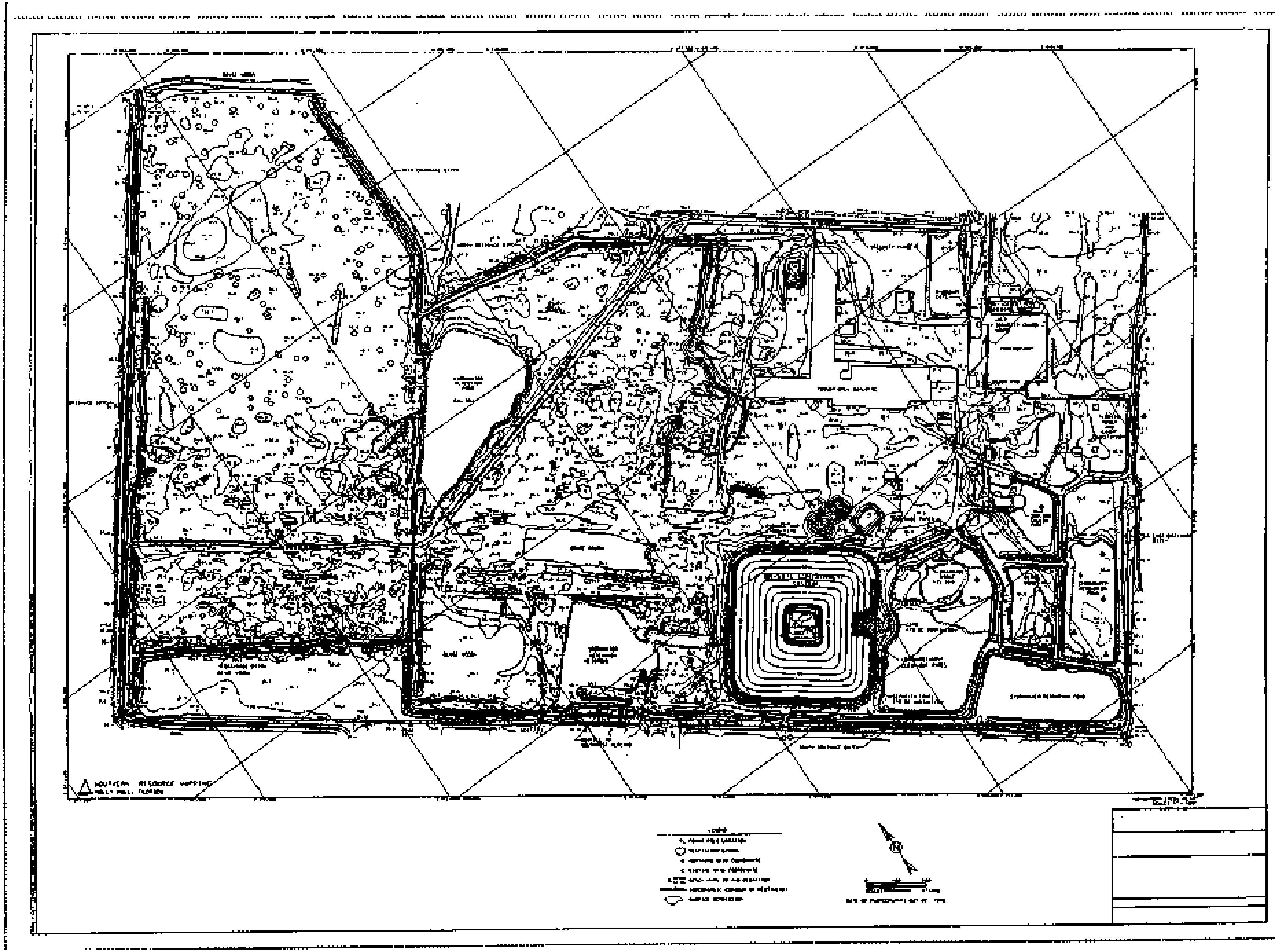
<u>Drainage and Surface Water</u>

Both surface and subsurface drainage in the Eastern Flatlands is sluggish because of the flatness of the terrain in the area. Ponds are formed throughout

Pre-Remediation Site Plan
Figure 2



Post-Remediation Site Plan
Figure 3



most of the region during the rainy season (Lichtler, 1960). Runoff in the Eastern Flatlands is between 5 and 10 inches per year (Hughes, 1975).

Prior to remediation, surface water on the site flowed either to the borrow pit in the southeast corner of the site or to the ditch along the south property line. Since the borrow pit and ditch are connected, water flowed from the borrow pit to the ditch. There was a break in the dike for the ditch at approximately the center of the south property line. Water flowing off-site through this break entered a marshy area (the Southwest Wetland) which slopes gradually to the south.

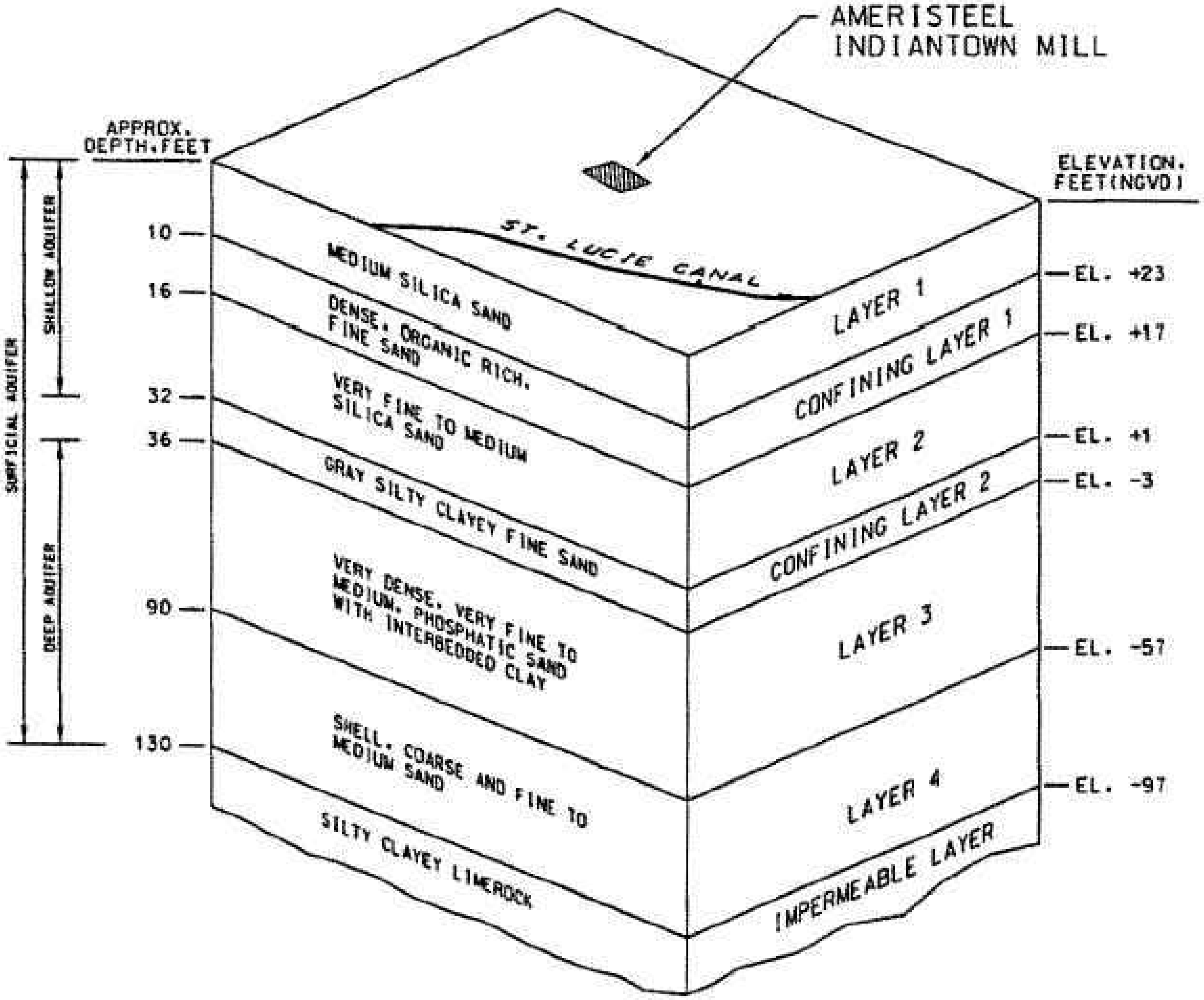
Areas excavated and verified during the RA program for OU-1 were graded to eliminate any surface depressions and to establish a drainage pattern. The drainage pattern directs surface runoff from the vault as well as other areas of the site through a network of drainage ditches and stormwater retention areas prior to discharge off-site via a culvert that connects the South Drainage Ditch with the Southwest Wetland.

Site Geology and Hydrogeology

The hydrogeological system at the site is depicted in Figure 4 and can be generalized as four aquifer units and two aquitards (i.e. leaky confining layers). Brief descriptions of these layers in descending order from ground surface to the bottom of the surficial aquifer are as follows:

- Layer 1 – A 10-foot thick unconfined aquifer unit consisting mostly of medium silica sand.
- Confining Layer 1 – A 6-foot thick hardpan layer consisting of dense, organic-rich fine sand.
- Layer 2 – A 16-foot thick leaky confined aquifer unit consisting mostly of very fine to medium silica sand.
- Confining Layer 2 – A 4-foot thick gray silty sand to fine sand layer with some dark gray fine sand, silt and clay.
- Layer 3 – A 54-foot thick leaky confined aquifer unit consisting mostly of very dense, very fine to medium phosphatic sand with interbedded clay lenses.
- Layer 4 – A 40-foot thick leaky confined aquifer unit consisting mostly of shell, and coarse and fine to medium sand.

Confining Layers 1and 2 are also referred to as the upper and lower confining units, respectively. Layers 1 and 2 are referred to as the shallow aquifer and Layers 3 and 4 as the deep aquifer. Collectively, the 130 feet of subsurface profile described above comprise the surficial aquifer at the site. The surficial aquifer is underlain by a relatively thick (greater than 500 feet), low permeability, silty to clayey limerock stratum. The top of this low permeability layer forms the



Site Geology
Figure 4

base of the surficial aquifer.

Based on historic water level readings obtained from on-site monitor wells, groundwater flow in the surficial aquifer is primarily in a southerly direction at a gradient of approximately 0.001 foot per foot. The depths to groundwater were typically between 1 and 4 feet below ground surface.

The Floridan aquifer occurs from 600 to 1,500 feet below land surface. Permeable parts of the Avon Park limestone and the Ocala Group Limestone comprise the principal producing zones of the Floridan aquifer.

B. Site Chronology

History of Operations

The Indiantown site was acquired by FSC in 1969 for the purpose of constructing a steel mill using electric arc furnace technology for recycling scrap steel, primarily junk automobiles, into new steel products including concrete reinforcing steel and round and square merchant bar. The Indiantown steel mill operated from November 1970 until February, 1982, when, because of the prevailing depressed economic conditions, FSC decided to temporarily cease production at the facility. The mill has not been operated since that time and the company has no present plans for its reopening.

Three types of byproducts were produced at the Indiantown Mill. These were mill scale, slag, and emission control (EC) dust. Mill scale was the oxidized iron that sloughs off the hot steel as it is being cooled with water sprays. It accounted for roughly 2 percent of the steel produced and has the same composition as the steel. Slag was formed on top of the steel in electric arc furnaces. It was formed from lime, which was introduced as a flux into the furnace to remove impurities such as soil and sand from the molten steel. Total primary metals present in the slag were barium, chromium and lead. At Indiantown, the slag was crushed and graded and sold as aggregate and fill material. EC dust is the fine particulate material generated as the high temperatures (greater than 3000 degrees F.) in an electric arc furnace drive off and oxidize some of the iron and most of the other volatile metals contained in the scrap. Roughly 25 to 30 lbs of EC dust was generated for every ton of steel produced. Typically at the Site, the major constituents in EC dust, in order of decreasing concentrations, were iron oxide, zinc oxide, and lead oxide.

During the lifetime of the plant, from November 1970 to February 1982, the EC dust was collected by a system of baghouses. Until November 17, 1980, the dusts captured in the baghouses were deposited in two on-site disposal areas (area B on Figure 3). After November 18, 1980, EC dust was regulated as an EPA-listed hazardous waste (KO61). Between November 18, 1980, and February 1982 the EC dust generated at Indiantown was shipped off-site under RCRA manifest.

Enforcement and Compliance

In December 1982, the FSC Indiantown Mill property was included on the National Priority List (NPL) under the provisions of CERCLA. The listing was based on the potential threat to the environment from the heavy metals present in the EC dust and the shallow water table. Early in 1983, FSC met with the FDER District Office and commenced the first phase of the site investigation, focusing on the EC dust disposal areas.

In March 1983 it was discovered that some of the soils in the vicinity of the concrete recirculating reservoir (CRR) and a small portion of the area containing the EC dust were contaminated with PCB's. The PCB contamination has been attributed to the use, in the early 1970s, of hydraulic fluid containing PCBs.

During 1985, FSC removed approximately 8000 tons of EC dust from both of the EC dust disposal areas and shipped it under manifest to a metal recycling facility for zinc recovery. Some EC dust was also removed as part of the PCB cleanup. However, EC dust is still present in the former disposal areas.

In compliance with the Consent Agreement between FSC and FDER dated September 4, 1985, approximately 11,200 cubic yards (18,800 tons) of soil, sediment and EC dust containing PCBs at a concentration of 50 ppm and above were excavated from the site between February 15, 1986 and May 8, 1986, and temporarily placed in a specially constructed secure on-site storage vault. The excavations were then backfilled with clean fill material.

Also in 1986, Florida Steel began a periodic groundwater monitoring program at the site.

In October 1986, Florida Steel developed a separate Feasibility Study that described options for the treatment of the PCB contaminated soil in the vault. In 1987, based on this feasibility study, Florida Steel was directed to incinerate the PCB contaminated soil.

In compliance with the Administrative Order on Consent between FSC and EPA dated September 21, 1987, incineration of the material in the vault began during October 1987 and was completed in May 1988.

Because of the presence of heavy metals, ash from the incineration was consolidated within the ash retention building pending final disposition. The ROD addresses final disposition of the ash.

FSC received a Special Notice Letter from EPA dated May 22, 1987 requesting that FSC conduct the Remedial Investigation/ Feasibility Study (RI/FS). The letter also stated that if FSC declined, then EPA would conduct the RI/FS and seek to recover its costs. FSC was the only party to receive a notice letter. A title search confirmed that Florida Steel was the only owner at the site.

FSC ultimately agreed to conduct the RI/FS. The State of Florida requested the enforcement lead for the project and an Order on Consent between FDER and FSC was signed September 22, 1987 (OGC #84-0150).

In 1988, FDER directed Florida Steel to conduct a RI at the site. The RI was conducted in two phases. During Phase I, soil and groundwater samples were collected from the most frequently used areas of the site. These samples were analyzed for the full range of hazardous substances. Metals such as cadmium, chromium, iron, lead, zinc were found in the samples.

Phase II of the RI included additional sampling to further define the extent of EC dust and to determine if PCBs were present in areas outside those previously addressed. Soil samples were collected from across the entire site and analyzed for PCBs and the metals that were most commonly found during Phase I.

Envirologic Data, Inc submitted a Baseline Risk Assessment for the Indiantown site. The Baseline Risk Assessment evaluated the current and potential risks posed by the contamination at the site under the no-action scenario for current future uses of the site.

The Feasibility Study (FS) was prepared after completion of the RI and Risk Assessment. The FS evaluated a range of remedial alternatives that would permanently reduce the volume, toxicity, and/or mobility of any contaminants of concern remaining at the site.

The chronology of the major actions at the FSC site is summarized in Table 1. The results of site investigations are presented in the next section. A comprehensive listing of site documents is provided in Attachment “A”

III. Results of Site Investigations

A. General

Pre-NPL Listing (1981)

In 1981, the Florida Department of Environmental Regulation (FDER) conducted a RCRA compliance inspection of the facility. Samples of Emission Control (EC) dust were obtained from uncontained waste piles on the site. FDER identified the piles of EC dust as possible RCRA violations and the facility subsequently removed that waste.

Information gathered during these early investigations contributed to NPL listing of the site in December 1982.

NPL Listing (1982) to ROD Signing (1992)

The formal reports and documents that have been generated by FSC documenting previous remedial investigations and activities at the Site are listed as follows:

- February 1983, the facility requested EPA withdraw the “Part A” permit for hazardous waste treatment, storage or disposal (TSD) facilities.
- October 1983, the FDER issued a warning notice to FSC stating that the facility was in violation of certain generator requirements.
- August 1984, a contractor for FDER collected several samples at the FSC facility.
- August 1987, At the request of FDER, a FSC contractor submitted a Preliminary Contamination Assessment Report (PCAR) for the site.
- December 1987, FDER issued a Consent Order to FSC. The order stated that the facility was to continue to assess contamination at the site and, at an unspecified date, to implement corrective actions or “ additional activities as may be appropriate”.
- July 1990, the Ecological Support Branch of EPA Region IV's Environmental Services Division conducted a comprehensive evaluation of ecological risk to five nearby wetland communities.
- March 1992, A wetland reconnaissance survey was conducted by a FSC contractor for the southwest wetland. The survey included mapping and identifying wetland plant species.
- 1983 - 1992, Sixteen rounds of groundwater sampling were conducted during this period. A comprehensive review of the groundwater sampling and analysis program was covered in the report entitled “Results of Groundwater Sampling through June, 1992 for the Florida Steel Corporation in Indiantown, Florida”.

- October 1991, Column Leaching Tests on Soil Contaminated with Emission Control Dust.
- October 1991, Column Leaching Tests on Slag and Slag Contaminated with Emission Control Dust.
- August 1990, Human Health and Environmental Risk Assessment of the Florida Steel Corporation, Indiantown Mill Site, Martin County, Florida.

The Phase I and II Remedial Investigations (RI) at the site were conducted in 1988 and 1989 in conformance with CERCLA guidance documents.

The Phase I RI was based on knowledge of the nature and location of prior industrial and disposal activities at the site gained during the prior investigations. The purpose of the Phase I RI was to identify all contaminants of concern at the site. During the Phase I RI, soil, sediment, groundwater, and surface water samples were collected from those areas of the site with the highest potential for contamination and analyzed for the full list of CLP/HSL parameters. The principal contaminants of concern identified were:

Soil	Groundwater	Surface Water	Sediments
Lead Cadmium PCBs Zinc	Lead Cadmium Radium 226/228 Sodium	Lead Cadmium Iron Zinc	Lead Cadmium PCBs Zinc

The purpose of the Phase II RI was to define the extent of contamination associated with EC dust and to determine if PCBs were present in those areas not previously investigated. To meet the objective of the Phase II RI, a sampling grid for the collection of soil samples was established across the site and 126 soil samples and 29 sediment samples were collected.

In 1992, a Feasibility Study (FS) was conducted for the Indiantown Mill site and presented in a report dated March 13, 1992. The FS Report addressed the economic and technical viability of a number of RA alternatives for the contaminated media. The overall objective of the FS was the development of a technically feasible, environmentally sound, and cost-effective treatment solution to permanently reduce the volume, toxicity, or mobility of hazardous substances present at the site.

FS results can be summarized as follows:

OU-1

- Several remedial alternatives were screened, using nine criteria: (1) Overall protection of human health and the environment; (2) Compliance with Applicable or Relevant and Appropriate Requirements (ARARs); (3) Long term effectiveness and permanence; (4) Reduction of toxicity, mobility, or volume through treatment (5) Short term effectiveness; (6) Implementability: being technically and administratively possible; (7) Costs; (8) State Acceptance; (9) Community Acceptance

- The recommended remedy included: (1) Excavation and off-site disposal at an EPA approved facility of approximately 600 cubic yards of soil contaminated with PCB levels equal to or greater than 50 ppm; (2) Excavation and on-site solidification of approximately 37,000 cubic yards of the following (EC dust and metals contaminated soil and ash, soil containing lead above 600 ppm, soil containing PCB levels between 25 and 50 ppm; (3) Control of surface water runoff from the site during remediation of on-site soils; (4) Compliance with Resource Conservation and Recovery Act (RCRA) Land Disposal Restriction treatment standards for EC dust, which is a listed RCRA waste, K061, by meeting levels specified in the treatability variance for contaminated soil and debris; (4) Disposal, in an on-site double lined RCRA landfill with a RCRA cap, of all solidified material. The landfill would meet the provisions of 40 CFR 264, Subpart N landfill requirements and would be built above the water table; (5) Periodic monitoring of surface water and groundwater quality. The quality of surface water runoff should be consistent with possible future criteria developed for the adjacent wetlands in the second operable unit for this site. Groundwater quality would be monitored for up to 30 years.

OU-2

- Several remedial alternatives were screened, using the same nine criteria as specified above; (1) Threshold criteria: the first two criteria, overall protection of human health and the environment and compliance with ARARs (or invoking a waiver), are the minimum criteria that must be met in order for an alternative to be eligible for selection; (2) Primary balancing criteria: the next five criteria are considered primary balancing criteria and are used to weigh major trade-offs among alternative cleanup methods; and (3) Modifying criteria: state and community acceptance are modifying criteria that are formally taken into account after public comment is received on the proposed plan. State and community acceptance is addressed in the responsiveness summary of the ROD.

- The groundwater cleanup includes extraction of groundwater, blending extracted groundwater with clean water from upgradient portion of the Site to meet federal and state MCLs, and disposal of the blended water through land application on an upgradient on-site spray field.

- The wetlands cleanup, for the upper portion of the Southwest Wetland, includes clearing existing vegetation, removal of contaminated sediment, and revegetation. Sediment with lead levels above 600 ppm were solidified and disposed of in the on-site landfill; excavated sediment containing lead at concentrations lower than 600 ppm but above 160 ppm would be used as a soil additive for excavated upland areas on-site.

Remedial Action Work Plan

Southwest Wetland

In July 1990, EPA Region IV Ecological Support Branch conducted a **Wetlands Impact Study**. The Wetland Impact Study report was issued in May 1991. The goal of this study was to provide the biological and chemical information necessary to evaluate the ecological hazards associated with wetlands contaminants. The results of the study can be summarized as follows:

- the Southwest Wetland is a highly functional wetland. However, there are indications that the contaminants in the Southwest Wetland, particularly in the northern portion, may cause adverse ecological effects;
- metals such as lead and zinc were present above screening values, particularly in sediment in the northern or upper portion of the Southwest Wetland;
- lead was detected in sediment at a concentration of 250 ppm at the sample location SW-10, which is located in the upper portion of the wetland;
- lead was detected at a much lower value, 8 ppm, at the sample location SW-11, located in the lower portion of the wetland;
- lead and zinc in surface water samples also exceeded surface water standards, again particularly in the northern portion of the Southwest Wetland;
- the degree of bioaccumulation, as described by the concentrations of metals in tissue from the available plants, animals, and insects, was also highest in the upper portion of the Southwest Wetland.

This concludes the summary of investigations conducted prior to signing of the ROD on June 30, 1992 for OU-1 and March 30, 1994 for OU-2. In the following sections, risks to human health and the environment, the provisions of the ROD, and subsequent remedial actions will be covered.

B. Contaminants of Concern

Contaminants of Concern (COC's) selected by EPA for the FSC site were those contaminants commonly associated with steel mill operations and which also posed a threat to human health and the environment. Factors used in the RI and ROD for the selection of COC's were:

- frequency of detection
- fate and transport
- concentration
- toxicity

Non-Wetlands COC's

OU-1

At this Site the contaminants of concern in soil are cadmium, chromium, lead, zinc, and PCBs. These contaminants are present in site soils because of the on-site disposal of EC dust and from leaks of hydraulic fluid containing PCBs. The contaminants of concern in groundwater are cadmium, lead, and radium-226 and 228. The presence of metals in groundwater is due to the leaching of metals from the soil and EC dust; therefore, soil cleanup levels have been developed for the protection of groundwater. The presence of radium in groundwater may be due to the discharge from a water softening system which may have increased leaching from native soils. Table 4 provides the reasonable maximum exposure concentrations for the contaminants of concern.

OU-2

The contaminants measured in the various environmental media during the RI were included in this discussion of the site risks if the results of the risk assessment indicated that a contaminant might pose a significant current or future risk or contribute to a cumulative risk that is significant. The criteria for a significant risk was a carcinogenic risk level above the acceptable risk range, i.e., $1x10^{-4}$ to $1x10^{-6}$, or a hazard quotient (HQ) greater than 1.0 (unity). In addition, contaminants, such as sodium, which are present at levels above state primary groundwater standards were also included as contaminants of concern.

The contaminants of concern in groundwater are sodium, gross alpha, and radium-226 and -228.

C. Potential Pathways for Contaminant Migration and Exposure

Pre-Remediation

The potential exposure pathways considered for the FSC site under the no-action scenario for present and future land use were:

1) Dermal contact and ingestion of contaminated soil by industrial workers under current and future use conditions at the site.

2) Non-potable use of groundwater, such as hand washing, for future conditions at the site.

3) Residential drinking water, residential bathing and showering at nearby off-site locations in the future if contaminated groundwater was not treated.

Post-Remediation

As a result of remedial actions at the FSC site, there are no remaining pathways for unacceptable risk to human receptors of COC's. This is assuming that stabilized /solidified contaminants entombed within the vault remain in their immobile, non-leachable state, and that land use restrictions in the area of the site remain in place.

D. Summary of Site Risks

Pre-Remediation

Human Risks:

The exposure pathway that contributed to possible human health risk was future residential consumption of groundwater at nearby off-site locations if contaminant concentrations were not reduced. This pathway was based on the assumption that a future resident would have a body weight of 70 kilograms (kg) and would drink 2 liters of water every day for 30 years.

Residential uses of the Site itself were not evaluated in the risk assessment. Deed restrictions on the use of the site were filed with the Martin County Clerk of Circuit Court. The deed restrictions limited use of the site to mostly industrial/commercial activities. The restrictions were already in effect and will remain in effect regardless of the cleanup activities that occur. In addition, a coal fired power plant has been constructed on adjacent property southwest of the Site. Furthermore, a 500-kilovolt electric power line has been constructed across the western portion of the site.

The nearest downgradient potable well was over 1,400 feet from the plume's boundary and is currently not impacted by the contamination plume. Therefore, ingestion of groundwater under current conditions was not quantitatively assessed. No potable or non-potable wells were currently in use on the site and consequently were not assessed under the current use scenario.

Given an estimated maximum flow velocity of 50 feet/year and a distance of approximately 1400 feet from the edge of the contaminated groundwater plume to the nearest residential well, it would take about 28 years for the plume to reach the nearest well. Nevertheless, groundwater samples were collected from the two wells nearest the Site during the RI. Concentrations of sodium and gross alpha were below drinking water standards in those wells.

Environmental Risks:

To date, no endangered or threatened species or associated habitats were identified on-site.

Site contaminants were detected at low levels in surface water from a retention pond on-site. Fish were present in the pond; ducks and other birds were seen occasionally at the pond. The pond received some runoff from a portion of the contaminated areas of the site.

Site contaminants were in the sediment and surface water of seasonally flooded wetlands adjacent to the site. On-site cleanup of contaminated soil was expected to reduce the metals levels in surface water runoff and ultimately improve surface water quality in the on-site pond and the off-site wetlands. Sampling will be required to document changes in surface water quality. Contaminated wetland sediment and contaminated groundwater will be evaluated in a second operable unit.

Post-Remediation

As a result of remedial action, COC source areas and pathways for OU-1 were effectively remediated. Additionally, the source areas for OU-2 are currently being remediated. Consequently, there are no known risks to humans or the environment at present. Remedial actions executed at the site are further described in Section IV, Paragraph C, and in Section VI of this report.

IV. Summary of Response Actions

A. Remedial Objectives

OU-1

The objectives of the RA program for OU-1 were to:

- Prevent or minimize the potential for release of hazardous substances to surface water bodies;
- Eliminate or reduce risks to human health associated with direct contact with hazardous substances occurring at the site;
- Eliminate or reduce the risks to human health from the inhalation/ingestion of hazardous substances at the Site;
- Eliminate or minimize the threat posed to human health and the environment from potential migration of hazardous substances in the surface and subsurface soils of the site;
- Reduce concentrations of hazardous substances in surface and subsurface soils of the site to levels specified by the performance standards; and,
- Reduce the volume, toxicity, or mobility of hazardous substances at the site.

OU-2

Southwest Wetland

The objectives of remediation for the Southwest Wetland were to:

- prevent the release of any hazardous substances, pollutants and contaminants to the aquifers;
- prevent the release of any hazardous substances, pollutants and contaminants to nearby surface water bodies and sediments;
- eliminate or reduce the risks to human health associated with direct contact with any hazardous substances, pollutants and contaminants within the wetland;
- eliminate or reduce the risks to human health from inhalation of any hazardous substances, pollutants and contaminants from the wetland;

- eliminate or minimize the threat posed to human health and the environment from current and potential migration of any hazardous substances in surface water, groundwater, and subsurface and surface soil at the wetland;
- reduce concentrations of any hazardous substances, pollutants and contaminants in surface water, groundwater, and sediment within the wetland to levels specified by the performance standards; and

- reduce the volume, toxicity or mobility of any hazardous substances, pollutants and contaminants at the wetland.

B. Remedy Selection

General

Based upon consideration of the requirements of CERCLA, the detailed analysis of the alternatives, and public comment, EPA selected the following remedies for the site:

OU1

The remedial alternatives developed in the FS report for this OU1 are divided into two groups: 1) treatment for PCB contaminated soils and sediment; and 2) treatment for EC dust and metal contaminated soils or sediment. The selected OU1 remedy involved:

- Excavation and off-site disposal at an EPA approved facility of approximately 600 cubic yards of soil contaminated with PCB levels equal to or greater than 50 ppm.

- Excavation and on-site solidification of approximately 37,000 cubic yards of EC dust and metals contaminated soil and ash. All EC dust and ash was excavated and treated; soil containing lead above 600 ppm was excavated and treated; soil containing PCB levels between 25 and 50 ppm was also excavated and treated.

- Control of surface water runoff from the site during remediation of on-site soils.

- Compliance with Resource Conservation and Recovery Act (RCRA) Land Disposal Restriction treatment standards for EC dust, which is a listed RCRA waste, K061, by meeting levels specified in the treatability variance for contaminated soil and debris.

- Disposal, in an on-site double lined RCRA landfill with a RCRA cap, of all solidified material. The landfill would meet the provisions of 40 C.F.R. Subpart N landfill requirements and would be built above the water table.

- Periodic monitoring of surface water and groundwater quality. The quality of surface water runoff should be consistent with possible future criteria developed for the adjacent wetlands in the second operable unit for this site. Groundwater quality would be monitored for up to 30 years.

- Use of appropriate dust control measures to reduce the potential for airborne transport of site contaminants during the remedial action, especially during the excavation of EC dust and contaminated soil. Similar steps were also taken during removal of the incinerator ash for solidification.

PCB contaminated soils that were excavated and temporarily stored on-site pending final treatment and/or disposal were stored in a manner that will prevent the PCBs from being carried away in surface water runoff. For example, stockpiled soil was covered with tarps or contained within berms. In addition, temporary storage of PCB contaminated soils were subject to TSCA requirements limiting storage to 30 days or less.

Groundwater monitoring was performed to ensure that soil lead cleanup levels and proposed landfill measures will remain protective of groundwater. As part of the remedial action, all surface water runoff was controlled and routed to the on-site surface water retention pond. Surface water samples were collected and analyzed for the site contaminants.

OU2

Groundwater Plume

Based on analyses and comparisons of a number of alternatives during the Feasibility Study completed by Ardaman & Associates, Inc. the following RA alternative was selected for the groundwater plume: “Withdraw Groundwater, Blend with Clean Water from upgradient portion of the Site, and Treat and Dispose of the Blended Water Through Land Application on an upgradient On-site Spray Field”.

In accordance with the selected RA alternative, remediation of the groundwater plume involves the withdrawal of groundwater through a system of shallow and deep recovery wells, blending the water from the plume with clean water from deep production wells located on upgradient portions of the site, and treatment and disposal of the blended water through land application on an approximately 40-acre, upgradient spray field. Clean water from the on-site production wells is injected through shallow and deep injection wells located outside and along the perimeter of the plume to enhance the rate of plume withdrawal and to maintain groundwater levels outside the plume.

Southwest Wetland

In summary, remediation of the Southwest Wetland involve the following specific tasks prior to revegetation:

- Clear vegetation from northern 3.8 acres of the Southwest Wetland (area within the cleanup boundary)
- Excavate the upper six inches of metals contaminated sediment within the cleanup boundary. Afterwards, excavate the remaining sediment and stockpile.
- Backfill the excavated area with clean sand and previously excavated sediment which contains lead and zinc below their respective screening values. The upper portion of the backfill layer should consist of at least six inches of clean sediment. The area should be backfilled so that the resulting ground elevation are approximately 12 inches lower than the original ground elevations. This change in ground elevation is intended to establish water levels necessary to enhance survival of new wetland vegetation.
- Revegetate the disturbed areas with native wetland vegetation in accordance with plans approved by EPA, FDEP, and Martin County.
- Monitor and maintain the revegetated areas to promote regrowth and to remove exotic or nuisance species. This maintenance period shall last at least five years.

Treatment of excavated wetland sediment involved:

- Excavated wetland sediment which contains lead above 600 ppm would be solidified and disposed of in on-site landfill to be constructed as part of OU-1. Solidification standards are the same as specified in the Record of Decision for OU-1.

C. Remedy Implementation

A **Remedial Action Work Plan** (RAWP) was developed to guide the implementation of the RD. The final RAWP for remediation of the groundwater plume was also submitted to the EPA and FDEP on February 15, 1996 along with the RD Report and Drawings.

As described in the RAWP, major tasks associated with implementation of the RD were grouped into three work phases, namely: (i) preparation phase, (ii) remediation phase, and (iii) closeout phase. The preparation phase activities included surveying, acquiring permits, setting up utility connections and other facilities, and construction of groundwater extraction, treatment, and disposal systems. Activities associated with the preparation phase have been completed and are the subject of this report. The remediation phase, which began in April 1997 upon review and approval of the startup test data by the EPA, involves extraction, treatment and disposal of groundwater from the plume. The startup test data were submitted to the EPA and FDEP on March 13, 1997, and was approved by the EPA on April 1, 1997. The closeout phase, which is projected to occur in 2002 when the clean-up standards have been achieved, will consist of a pre-certification inspection of the site and preparation of an RA Report.

Remedial Design - Wetlands

The Wetland Impact Study indicated that the Southwest Wetland is a highly functional wetland. However, the Study indicated that the contaminants in the Southwest Wetland, particularly in the northern portion, may cause adverse ecological effects.

According to the results from Wetland Impact Study, metals such as lead and zinc were present above screening values, particularly in sediment in the northern or upper portion of the Southwest Wetland. Lead was detected in sediment at the upper portion of the wetland. Lead was detected at a much lower value in the lower portion of the wetland. Lead and zinc in surface water samples also exceeded surface water standards, again particularly in the northern portion of the Southwest Wetland. In addition, lower numbers of individuals and species of animals and insects were found in the northern portion of the Southwest Wetland; crayfish and tadpoles were absent from the sampling location in the northern portion of the Wetland. The degree of bioaccumulation, as described by the concentrations of metals in tissue from the available plants, animals, and insects, was also highest in the upper portion of the Southwest Wetland. Toxicity testing of water and sediment samples upon test organisms was inconclusive. It was not possible to determine whether the water and sediment samples or the test methods themselves affected the test organisms.

Remedial Action

OU-1

Excavation of Contaminated Materials

Excavation activities associated with the OU-1 remediation began in January 1995 and continued through November 1995, generally in accordance with the following sequence: North Ditch, West Ditch, West Area, Corridor Area, South Area, Area G, PCB Area, East Ditch, and South Ditch. The excavation and the handling of the excavated materials were performed by a Specialty Contractor (OHM Remediation Services Corporation of Clermont, Florida) under the direction of the RA Supervising Contractor.

A description of the excavation operation and materials encountered in each of the above-contaminated areas is presented below:

Ditches

During ditch excavation, at least 6 inches of sediments were removed from the sides and bottoms along segments of the ditches where previous and/or additional sampling indicated that lead and/or PCB concentrations were above the established clean-up criteria.

After excavation, the ditch sediments were transported to the former mill building and stockpiled under roof on a concrete floor. The slope of the concrete floor directed the water draining from the stockpiled sediments into shallow sumps, where the water was pumped into drums for later use in the solidification/stabilization (S/S) operation. The ditch sediments were not screened because of the general absence of oversize material greater than 1 inch.

At completion of excavation approximately 2,500 lineal feet of ditches were remediated resulting in approximately 3,800 cubic yards of sediments removed from the four ditches.

West Area

The West Area, which occupied an area of approximately 2 acres was one of the two former on-site EC dust disposal areas. Materials present in the West Area included EC dust, slag and lead-contaminated soils. These materials were excavated and transported to the area south of the former mill building for screening and stockpiling.

At completion of excavation, approximately 4,800 cubic yards of EC dust, slag and lead-contaminated soils were removed from the West Area.

Corridor Area

The Corridor Area consisted of a relatively long and narrow tract that encompassed approximately 2 acres on the west side of the Indiantown Mill site. This area had been used as a railroad spur to store railroad cars loaded with scrap metal and automobile parts when the mill was in operation. Materials encountered in this area included scrap metal, construction debris, railroad ballast and lead-contaminated soil. These materials were excavated and transported to the area south of the former mill building for screening and stockpiling. Some railroad ties were also encountered in this area during excavation. These railroad ties were temporarily placed beyond the excavation limits for storage, and eventually disposed of in the on-site containment system.

At completion of excavation, approximately 3,200 cubic yards of scrap metal, construction debris, railroad ballast, lead-contaminated soil and railroad ties were removed from the Corridor Area.

South Area

After the contaminated soils were removed from the Corridor Area, excavation proceeded to the South Area. The South Area, which was located south of the former mill building and occupied an area of approximately 11 acres, was one of the two former on-site EC dust disposal areas. In addition to the EC dust, this area also contained debris and lead-contaminated soil. The debris, which was generated when the mill was operating and discarded as solid wastes in the South Area, was removed and screened to separate it from the EC dust and lead-contaminated soils. After screening, the materials were stockpiled in the area south of the former mill building.

At completion of excavation, approximately 26,600 cubic yards of EC dust, debris and lead-contaminated soil were excavated from the South Area.

Area G

Area G is located east of the South Area and occupied an area of approximately 2 acres. Muck samples recovered from this area during the RA program for OU-1 confirmed lead concentrations exceeding the established clean-up criteria. The contaminated muck was excavated and stockpiled in the area south of the former mill building. The muck was not screened because of the general absence of oversize materials.

At completion of excavation, approximately 3,200 cubic yards of contaminated muck were excavated from Area G.

PCB Area

The PCB Area, which encompassed an area of 1.8 acres, was located between the Florida Power & Light substation and the former mill building. The PCB-contaminated soils and mill scale present in this area were removed and transported to the former rolling mill building for storage. No screening was necessary because of the limited amount of oversize materials.

At completion of excavation, approximately 1,900 cubic yards of PCB-contaminated material were removed from the PCB Area.

OU-2

Groundwater Remediation and Spray Irrigation System

The groundwater remediation and spray irrigation system installed at the AmeriSteel Indiantown Mill is depicted in Figure 5 and consists of the following major components:

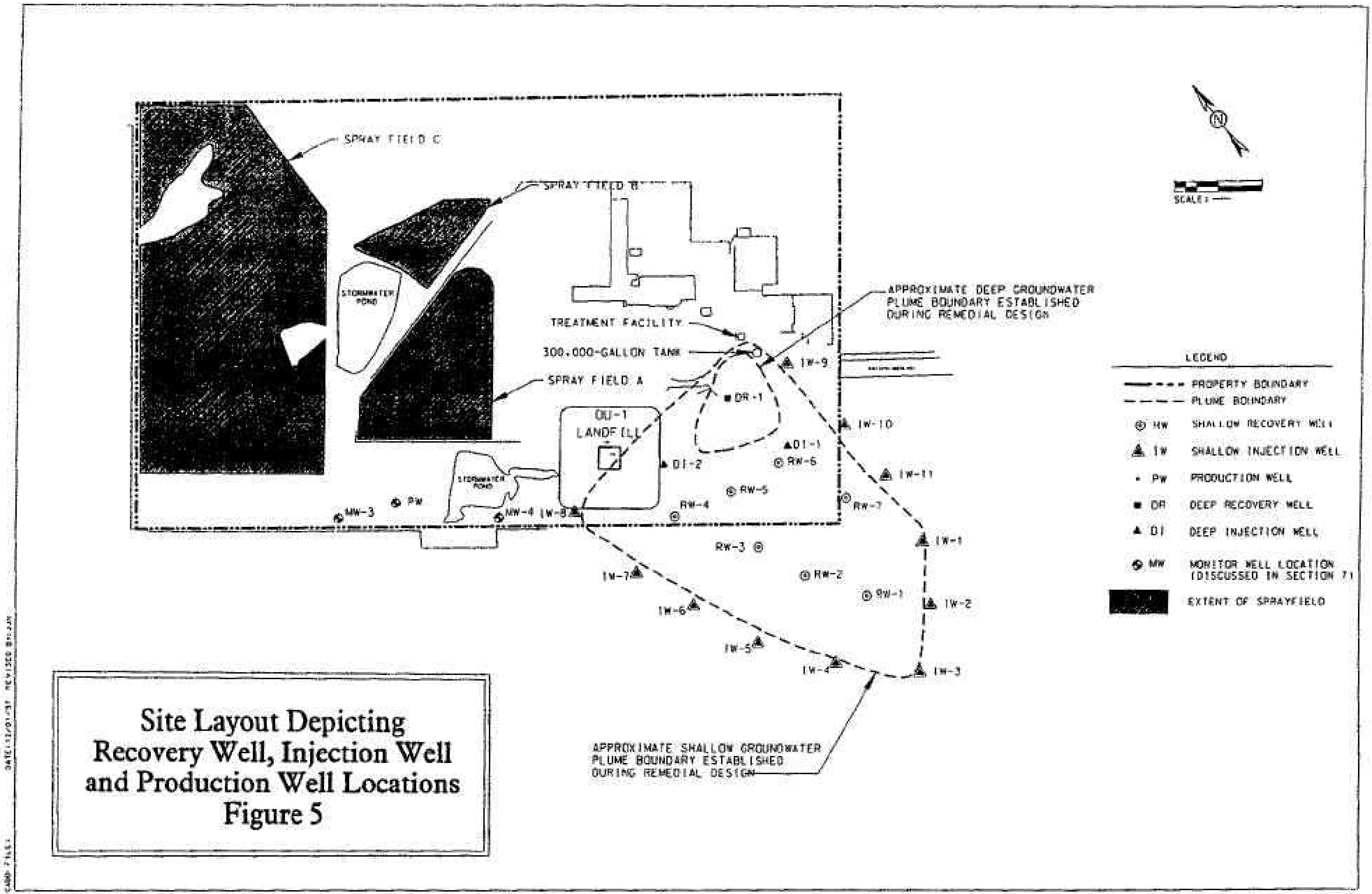
- Seven shallow recovery wells, designated RW-1 through RW-7, within the area of the shallow groundwater plume, and one deep recovery well, designated DR-1, within the area of the deep plume.

- Eleven injection wells, designated IW-1 through IW-11, along the perimeter of the shallow groundwater plume, and two deep injection wells, designated DI-1 and DI-2, along the perimeter of the deep plume.

- Five production wells, designated PW-1 through PW-5, in an upgradient area of the site.

- A treatment facility equipped with a recovery well manifold, a production well manifold, an injection well manifold, an aeration tank and a filtration unit for removal of iron and total suspended solids (TSS) from the production well water, a 500-gallon surge tank, and an irrigation pump station.

- A 300,000-gallon, aboveground, steel storage tank.



Site Layout Depicting Recovery Well, Injection Well and Production Well Locations
Figure 5

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- A 40-acre spray field consisting of three separate land parcels (designated Spray Fields A, B, and C) and 31 irrigation zones located in an upgradient area of the Indiantown Mill where the production wells were installed.

- A piping and electrical conduit system that connects the remediation wells, the treatment facility, the 300,000-gallon tank, and the 40-acre spray field.

- Six groundwater monitor wells designated MW-1 through MW-6 within the spray field areas and at the downgradient property boundary. Figure 6 depicts the location of the monitoring wells.

All components of the groundwater remediation system were constructed as part of the RA Program for OU-2, except the 300,000-gallon storage tank that was installed in 1975 when the steel mill was in operation. Tank Engineering and Management Consultants, Inc., of Tampa, Florida inspected the tank in January 1995. Following the inspection, some minor repairs were performed on the tank to comply with applicable requirements for a water storage tank. The storage tank is provided with a water depth gauge to monitor the water level in the tank.

Roles and Responsibilities

Remedial activities were conducted principally by Ardman & Associates and by OHM Corp., the responsible parties (RP) contractor. The RP was Florida Steel Corporation. EPA Region IV or its representatives and contractors provided oversight. Technical review and approval of wetlands restoration was provided by FDEP.

QA/QC

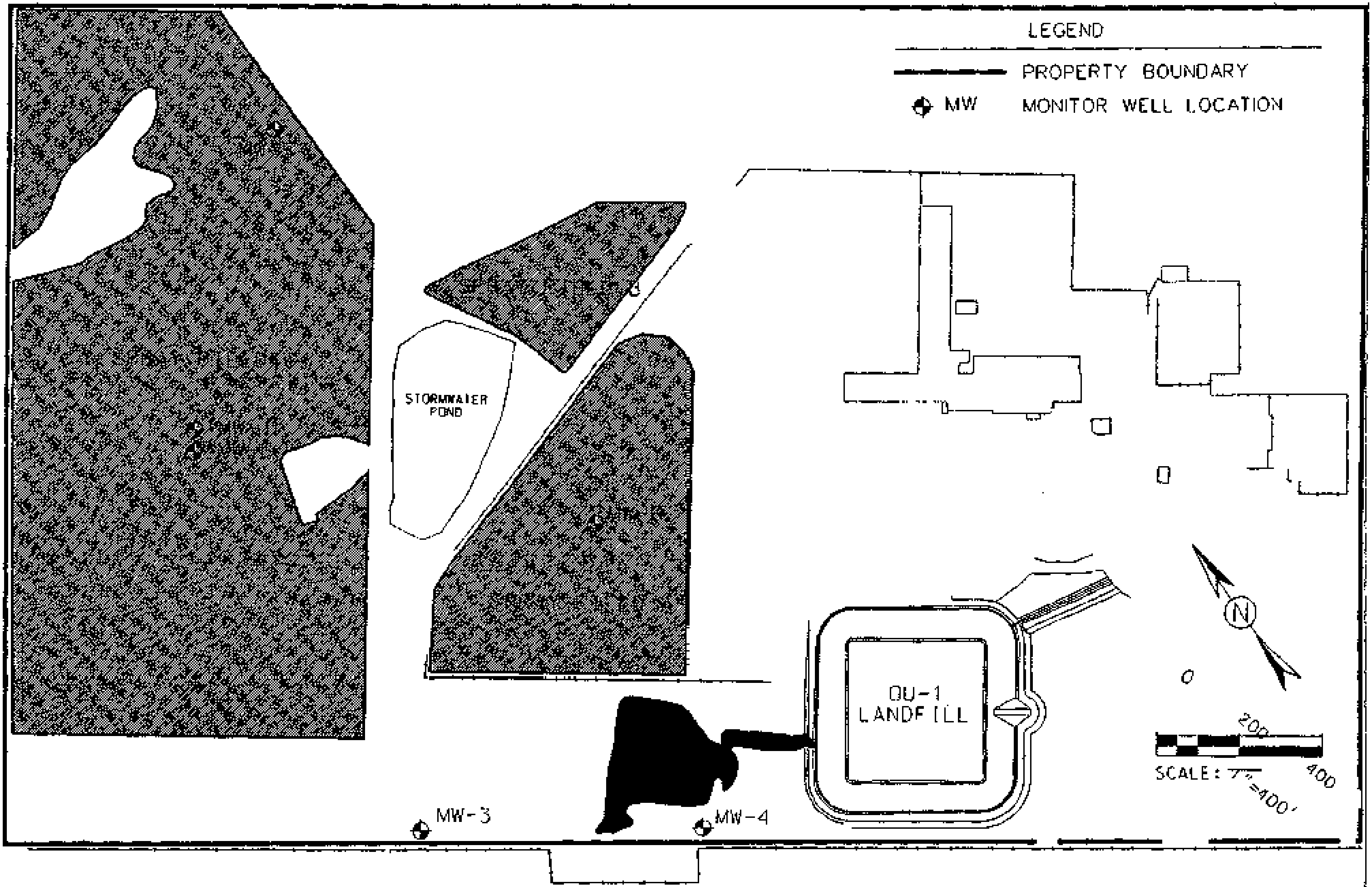
Quality assurance/quality control (QA/QC) procedures included regular site visits by EPA, and testing of QA/QC split samples at a frequency of 5 to 10 percent of the total number field samples for each media of concern. All sampling and testing was conducted in accordance with EPA protocols and/or approved methods.

RA Documentation

Remedial actions executed at the FSC site are summarized in the following reports:

- “Remedial Action Report, Operable Unit 1, AmeriSteel Indiantown Mill, Martin County, Florida”, Volume I, Revision No. 0, Ardaman & Associates, Inc., September 23, 1996.

Site Layout Depicting
Monitoring Well Locations
Figure 6



- “Remedial Action Work Plan, Remediation of Groundwater Plume, Operable Unit 2, Florida Steel Corporation, Indiantown Mill, Martin County, Florida”, Revision No. 1, Ardaman & Associates, Inc., February 15, 1996.

- “Remedial Action Report for Southwest Wetland, AmeriSteel Indiantown Mill, Martin County, Florida”, Revision No. 1, Ardaman & Associates, Inc., December 13, 1996.

Effects of Remediation on Physical Characteristics of Site

The effects of remediation on the physical characteristics of the site (site layout, topography, drainage/surface water, hydrogeology) have been previously discussed in Section II, Paragraph A of this report.

D. Operation and Maintenance (O&M)

The O&M program for the FSC site is detailed in the following documents:

- “Performance Standards Verification Plan, Remediation of Groundwater Plume, Operable Unit 2, Florida Steel Corporation, Indiantown Mill, Martin County, Florida”, Revision No. 1, Ardaman & Associates, Inc., February 15, 1996.

- “Operation & Maintenance Plan and Performance Standards Verification Plan, Operable Unit 1, AmeriSteel Indiantown Mill, Martin County, Florida”, Revision No. 0, Ardaman & Associates, Inc., August 26, 1996.

- “Operation and Maintenance Manual Groundwater Remediation and Spray Irrigation System, Operable Unit 2, AmeriSteel Indiantown Mill, Martin County, Florida”, Ardaman & Associates, Inc., November 5, 1997.

The objectives of the O&M program, as condensed from these documents are:

- to outline procedures for start-up and routine operation, troubleshooting, training, data evaluation, and record keeping;
- to ensure that the elements completed during the RA program will be properly inspected, maintained, and repaired;
- to evaluate the short and long term effectiveness of the RA program

Landfill O&M

The O&M activities for OU-1 involve the following tasks: routine quarterly inspections, routine maintenance (e.g., mowing, weeding, etc.), routine sampling of surface water for lead, zinc, pH, conductivity and hardness whenever significant discharge occurs from the site to the Southwest Wetland, checking and, if necessary, removal of leachate in the leachate collection and leak detection sumps, and annual sampling and analyses of three existing wells (M-71, RW-4 and RW-5) for PCBs, lead, cadmium, chromium and nickel.

Groundwater O&M

Presently, the O&M activities for OU-2 involve the following tasks: quarterly sampling of the recovery wells (RW-1 through RW-7 and DR-1) for sodium and conductivity and annual sampling for radium (226+22) and gross alpha; monthly sampling of the storage tank effluent for conductivity and sodium and semi-annually for radium (226+228) and gross alpha; annual sampling of the spray field soil samples for sodium, radium and gross alpha; annual groundwater sampling of the following shallow aquifer wells: MW-1, MW-3, MW-4, MW-5, MW-6, M-19, M-25, M-50, M-52, M-65, M67, M-68, M-90, M-96, and the following deep aquifer wells: MW-2, M-22, M-40, M-73, M-74, M-76, M-80, M-81, M-86, M-87, M-91, M-94, M-95 for analyses of pH, temperature, conductivity, turbidity, sodium, radium 226, radium 228 and gross alpha.

Wetlands O&M

Restoration of the Southwest Wetland began in July 1995 and was completed in December 1995. Formal inspections of the Southwest Wetland were made on May 15, 1996, December 6, 1996, March 19, 1997, and October 22, 1997. A request for termination of the monitoring program for the Southwest Wetland was submitted to the EPA on September 8, 1998.

The Revegetation Contractor made site inspections for a period of five years after revegetation of the Southwest wetland. During the first year, inspections included monthly inspections for the first three months following planting, and quarterly inspections thereafter. Annual inspections were made after the first year for a total inspection and monitoring period of at least 5 years. The Revegetation Contractor recommended maintenance actions such as replacement plantings, erosion control, water level adjustments, and removal or herbicidal applications for nuisance or exotic species.

O&M Costs

O&M Costs are approximately $55,000 year. This cost includes landfill inspections, mowing the vegetative cover, implementation of weed control measures around the drainage ditches and swales, and annual groundwater monitoring.

V. Summary of Site Visit and Findings

A. General

This Five-Year Review consisted of the following activities: a review of relevant documents (see Attachment A, Documents Reviewed), interviews with the EPA Project Manager, the FSC Site Manager, and the FDEP Project Manager, a site inspection, an inquiry to the local information repository, and preparation of the Five-Year Review report.

B. Interviews

Mr. Randy Bryant, EPA Region IV Remedial Project Manager (RPM) for FSC.

Mr. Bryant was interviewed when site documentation was gathered from the EPA. In addition to facilitating the gathering of documentation, Mr. Bryant provided information on site history, remedial actions, and current site status. Mr. Bryant feels that all remedial objectives for OU-1 and the southwest wetland have been met.

Mr. Jim Turner, Project Coordinator, Ameristeel

Mr. Turner was interviewed by phone on several occasions. Mr. Turner has had extensive involvement with the site since the early 1980's. He currently manages the site as an employee of the RP, Ameristeel, Inc, and conducts quarterly inspections. Valuable information on site history, remedial actions, and current site status was obtained during the interviews, much of which is included in this report. Mr. Turner feels that all remedial objectives have been met. He was not aware of any complaints or issues at the community level. He stated that the responsiveness and professionalism of the EPA Region IV RPM has been excellent.

Dr. Marvin Collins, Florida Department of Environmental Protection (FDEP) Project Manager.

Dr. Collins, FDEP Tallahassee office, reviewed the remediation program at the Indiantown Mill

C. Site Inspection

General

The Five-Year Review site inspection for FSC was held on April 27, 2000. The weather was warm, sunny and clear.

The following individuals were in attendance:

1. Francis K. Cheung, Senior Project Engineer, Ardaman & Associates, Inc.
2. Donnie Douglas, O&M Program Supervisor, Ardaman & Associates, Inc.
3. Ed Villano, Lead Project Engineer, USACE, Jacksonville District
4. Steve Hand, Technical Liaison, USACE, Mobile District

Mr. Douglas provided site access and escorted the USACE site inspection team throughout the site. The following areas were visited: the administrative office, the landfill, the southwest wetland, and the groundwater recovery manifold and storage tank. The entirety of the site could either be viewed or inspected from these areas. Photographs showing current site conditions are presented at the end of this document.

Land use adjacent to the site appeared to be a mixture of industrial and undeveloped, as described in Section II, Paragraph “A” of this report. No environmental damage was observed, such as stressed vegetation, discolored earth, or odors.

Site Security

An 8-foot chain link perimeter security fence with a barbwire crown was observed bordering the site. The fence appeared to be in good condition. The access gate is located at the northeast end of the property. As the inspection team approached the site by vehicle, the access gate was observed to be unlocked. Additionally, there was no signage indicating that the site was an EPA Superfund Site.

Southwest Wetland

The wetland areas and site pond appeared to be a thriving habitat for both flora and fauna. The percentage of nuisance species such as cattails and water hyacinths did not appear to be a problem. Non-nuisance, non-exotic wetland species appeared to meet or exceed the 85 percent coverage success criteria.

Landfill

The landfill base was square-shaped. The landfill or vault covers an area of approximately 6 acres within the former South Excavation Area. The top elevation of the vault is at approximately +84 feet (NGVD), corresponding to about 50 feet above the surrounding grade. The vegetative cover of the landfill appeared to be in good condition, with thick coverage of native grasses. No trees with deep-penetrating roots were observed on the land. No evidence of erosion was observed.

Sprayfields

The entire spray field occupies an area of approximately 40 acres. It is divided into three non-contiguous land parcels identified as Spray Fields A, B and C with areas of approximately 8, 3 and 30 acres, respectively. The three spray field parcels were graded and drainage swales were constructed to promote proper stormwater runoff from the spray areas. The surface slopes within the spray field areas ranged from approximately 0.25 to 0.50 percent. The 40-acre spray field contains a total of 31 irrigation zones. Spray Fields A, B and C contain 6, 2 and 23 zones, respectively.

Treatment System

Major components installed within the treatment facility included a recovery well manifold, an injection well manifold, a production well manifold, an aeration tank, an iron filtration unit, a 500-gallon surge tank, an irrigation pump station, and a number of electrical, instrument and control panels. The treatment facility has an approximate dimension of 25 feet by 30 feet, and was constructed on top of a 6-inch thick reinforced concrete slab located in the immediately vicinity of the 300,000-gallon storage tank. The facility is fully enclosed by a 7-foot high chain link fence topped with three strands of 4-point barbed wire. An entrance gate was installed to allow access to the facility by service personnel.

Recovery Well Manifold

Each influent line of the seven shallow and one deep recovery wells enters the treatment facility through an opening in the concrete slab. The 1-inch diameter, Schedule 80 PVC influent line of each recovery well is fitted with a turbine-type flow totalizer for flow measurements and a globe valve for flow rate adjustments.
In addition, the influent line of each recovery well is provided with a sampling port for water sampling. The influent lines of the recovery wells are connected to a lateral pipe to form the recovery well manifold. The recovery well manifold was constructed to combine and control the flow from the eight recovery wells for blending with the production well water. The recovery well manifold was constructed of 2-inch diameter, Schedule 80 PVC pipes, tees, elbows and end caps.

Production Well Manifold

Each influent line of the five production wells enters the treatment facility through an opening in the concrete slab. The 2-inch diameter, Schedule 80 PVC influent line of each production well is fitted with a turbine-type flow totalizer for flow measurements and a globe valve for flow rate adjustments. The influent lines of the production wells are connected to a lateral pipe to form the production well manifold. The production well manifold was constructed to combine and control the flow from the production wells, most of which is used for blending with the recovery well water and a small part for groundwater injection. The production well manifold was constructed of 4-inch diameter, Schedule 80 PVC pipes, tees, elbows and end caps. One end of the lateral pipe in the production well manifold is connected to the lateral pipe of the recovery well manifold through a common header pipe with an exit tee for eventual discharge to the 300,000-gallon storage tank after the blended recovery and production well water passes through a static in-line mixer. The installed in-liner mixer is a KOFLO Corporation Series 328 PVC static mixer with six mixing elements. The other end of the lateral pipe in the production well manifold was tapped by piping that connects to the aeration tank and iron filtration unit.

Infection Well Manifold

Water for the injection wells is tapped from one end of the lateral pipe in the production well manifold. The flow rate is controlled by a globe valve, and the total flow is measured by a flow totalizer located at the end of the lateral. The production well water for injection is treated for iron to prevent well screen incrustation. The treated water is delivered by a transfer pump to the injection well manifold consisting of a header pipe and a branch tee that connects to the 13 one-inch diameter, influent lines to the eleven shallow and two deep injection wells through an opening in the concrete slab. Each influent line of the injection wells is fitted with a check valve to prevent backflow, a pressure gauge to monitor hydraulic pressure, a globe valve to adjust flow rates, and a turbine-type flow totalizer to measure flow quantity. The injection well manifold was constructed of 2-inch diameter, Schedule 80 PVC pipe, tees, elbows and end caps.

D. Local Information Repository

The local information repository for FSC, Indiantown Public Library, located in downtown Indiantown, Florida, was contacted concerning the availability of site documentation. Documentation was on file and available for public review.

E. Ameristeel Indiantown Mill Superfund Site ARAR Review

An ARAR review was performed for the site in accordance with the draft EPA guidance document, “Comprehensive Five-Year Review Guidance” EPA 540-R-98-050, April 1999.

Documents reviewed for the ARAR analysis:

1. June 30, 1992 ROD for OU-1 for soils
2. Preliminary Close Out Report (September 4, 1997)
3. Annual Report for the Groundwater Remediation Program for OU-2 (September 25, 1998)
4. OU-2 ROD for Groundwater and Wetlands
5. Surface water quality data as provided to the Corps from Ardman and Associates, Inc. on 30 June 2000

ARARs Identified in Section 10.2 of the OU-1 ROD for Soils Requiring Evaluation During the Five-Year Review:

1. Toxic Substance Control Act (TSCA), 40 CFR 761 Subpart G, PCB Spill Cleanup Policy

The only chemical-specific ARARs identified in the OU-1 ROD relating to protectiveness of the soil remedy (i.e., cleanup levels) requiring a five-year review are the TSCA cleanup levels of 40 CFR 761, Subpart G. The OU-1 ROD specified the TSCA cleanup level of 25 ppm. In 1998, PCB cleanup levels specified in 40 CFR 761 were amended. The new cleanup levels for remediation waste for PCBs specified in 40 CFR 761.61 (a)(4) specify $\leq$ 25 ppm for low occupancy areas. “Low occupancy areas” are defined in the 1998 PCB regulations as areas with < 335 hours of exposure per individual per year. The OU-1 ROD states that site is designated as a restricted access area (see OU-1 ROD, Section 9.1, Remediation Goals). As long as the area remains a restricted access area with individuals working <335 hours on-site, the current remediation goal of 25 ppm PCBs is within regulatory limits.

ARARs Identified in Section 10.2 of the OU-1 ROD not Requiring a Review:

Other ARARs identified in the ROD for OU-1 (listed below) are all action- or location-specific ARARs applicable to the actual action taken at the site during remedial action and are no longer germane to site conditions or protectiveness at the current time. The 1997 Preliminary Close Out Report for the site indicated that all construction activities (which would include landfill design and performance standards) had been done in accordance with the ROD, remedial design, and remedial action workplans. Therefore, it is assumed that all action- and location-specific ARARs were complied with during the actual construction period.

1. RCRA Land Disposal Restrictions (LDRs) for listed waste K061 via meeting treatment levels specified in the treatability variance for contaminated soil and debris.
2. 40 CFR 261, Subpart C, Characteristics of Hazardous Waste
3. 40 CFR 264, Subpart N, Landfill Requirements
4. 40 CFR 268, Subpart C, Prohibitions on Land Disposal
5. Toxic Substance Control Act (TSCA), 40 CFR 761, Subpart D, Storage and Disposal of PCBs
6. TSCA, 40 CFR 761, Subpart K, PCB Disposal Recordkeeping
7. Federal Occupational Safety and Health Administration (OSHA) worker protection standards
8. Clean Air Act National Ambient Air Quality Standards (NAAQS)
9. Florida Department of Environmental Regulations for Class III Surface Water Bodies

<u>ARARs Identified in Section 8.1, Tables 5 and 6 and Section 9 of the OU-2 ROD for Sediments and Groundwater Requiring Evaluation During the Five-Year Review:</u>

1. 40 CFR 131, Federal Ambient Water Quality Standards
2. 40 CFR 141, Federal Primary Drinking Water Standards
3. Florida Administrative Code 17-610, Florida Primary Drinking Water Standards

The 1998 Annual Report for the Groundwater Remediation for OU-2 indicates that groundwater contaminant levels have not yet met the MCL ARAR levels. However, the remedy is still operational and remediation of groundwater to meet Federal and State MCLs for radium and sodium is still in progress.

Federal Ambient Water Quality Criteria (AWQC) enforcement is delegated to the State of Florida and therefore Florida State AWQC are the actual ARARs for the site. The OU-2 ROD states in Section 9C under Compliance Testing that surface water flowing from the FSC property into the Southwest Wetland shall be sampled to ensure Florida Surface Water Quality Standards are not exceeded. Florida Surface Water Quality Standards are found in F.A.C. 62-302.530 and are set, as follows, for site contaminants and other parameters:

Florida Class II Surface Water Quality Criteria
62-302.530 F.A.C.

Parameter	Units	Standard
Zinc	ug/L	≤ 86
Lead	ug/L	≤ 5.6
Sodium	NA	None
Radium	Picocuries/L	≤ 5
Gross alpha	Picocuries/L	≤ 15
Temperature	NA	Applies to heated water discharges per 62-302.520 F.A.C.
PH	Units	± 1 unit from background
Conductivity	microohms/cm	None
Turbidity	NTU	≤ 29 above background
Hardness	mg/L	None

For the surface water parameters currently being sampled, the standards are being met. However, not all parameters relating to site contaminants of concern are being monitored. As part of the remedy, groundwater is sprayed onto the land and is therefore subject to stormwater runoff to surface water. Groundwater contaminants should also be monitored in any site discharges to surface water. Radium and gross alpha were the primary contaminants being monitored for in groundwater (sodium, also, but sodium does not have a designated Florida Class II surface water quality standard). Therefore, to ensure compliance with surface water quality ARARs, discharges of site stormwater to surface water should also be monitored for gross alpha and radium to ensure the discharges meet ARARs specified in the ROD.

ARARs Identified in Section 8.1, Tables 5 and 6 and Section 9 of the ROD for OU-2 not Requiring a Review:

Other ARARs identified in the ROD for OU-2 (and listed below) are all action- or location-specific ARARs applicable to the actual action taken at the site during remedial action and are no longer germane to site conditions or protectiveness at the current time. The 1997 Preliminary Close Out Report for the site indicated that all construction activities (which would include landfill design and performance standards) had been done in accordance with the ROD, remedial design, and remedial action workplans. Therefore, it is assumed that all action- and location-specific ARARs were complied with during the actual construction period.

1. 40 CFR 6.302(a), Wetlands Protection Executive Order
2. 40 CFR 6.302(h), Endangered Species Protection
3. CWA Section 404
4 Florida Administrative Code 17-49(E)(4), Surface Water Management Standards
5. Florida Administrative Code 17-3, General Water Quality Criteria, Groundwater Classifications
6. 40 CFR 122-129, NPDES permitting requirements
7. 40 CFR 146, Technical Criteria and Standards for the UIC Program
8. CWA 402(a)(1), Effluent Limitations/State Water Quality Standards
9. 40 CFR 107 and 171-1709, DOT Requirements for Transportation of Hazardous Materials
10. Florida Administrative Code 17-610, Reuse of Reclaimed Water and Land Application
11. Florida Administrative Code 17-302.300, Anti-degradation Policy for Surface Water Quality
12. Florida Administrative Code 17-28, Regulations to Control Discharges to Groundwater
13. Florida Administrative Code 17-4, FDEP permitting requirements

Compliance with ARAR Summary Statement:

Based upon the documents reviewed, it appears that ARARs are being complied with or are expected to be complied with at the conclusion of the remedial action. The groundwater system captures all groundwater with contaminants above the MCLs, but it will take approximately 7-10 years before MCLs are satisfied within the area of the groundwater plume. Contaminated groundwater is blended with clean water extracted from an uncontaminated portion of the aquifer. The blended water meets drinking water standards (MCLs) before it is discharged to the on-site sprayfield.

Radium and gross alpha were not included in the original requirements for surface water discharge monitoring. However, in January 2000, the PRP agreed to analyze samples of runoff from the sprayfield for these constituents. It is worthwhile to note that the system operation was intended to minimize runoff and has not been operated historically during periods when the groundwater level was less than 12 inches below grade, such as during periods of heavy rain. Also, soil in the sprayfield is sampled periodically for sodium and radium in order to evaluate whether there is any accumulation of those contaminants.

F. Groundwater Data Review

Extraction and Discharge Standards

Operation of the groundwater remediation system must comply with the groundwater extraction and discharge standards established in the Record of Decision (ROD). The groundwater extraction and discharge standards for remediation of the groundwater plume for OU-2, as stated in the ROD, are as follows:

Constituent	Florida Standards	Federal Standards
Sodium (mg/l)	160	Not Applicable
Radium 226+228 (pCi/l)	5	5
Gross Alpha (pCi/l)	15	15

The ROD requires extraction of groundwater to continue until the water in the plume meets the extraction standards or until EPA has agreed that the constituents of concern have ceased to decline and remained at levels higher than the extraction standards. Further, prior to application on the spray field for land treatment, the blended recovery and production well water is required to meet the discharge standards.

Collection of Operational Data

The groundwater remediation system is operated and maintained by an employee of AmeriSteel, Inc. Monitoring data are collected and documented during system operation. These data include flow readings for the recovery wells, production wells and injection wells, and conductivity readings for the recovery well water, the production well water, and the blended recovery and production well water. In addition, rainfall is documented using an on-site rain gauge.

A flow totalizer was installed for each recovery well and each production well to record the quantities of groundwater removed from the aquifer. In addition, three flow meters are provided to document the total flow from all recovery wells at the recovery well manifold, the total flow from all production wells at the production well manifold, and the total flow from the recovery and production wells to the 300,000-gallon storage tank. Two flow totalizers were also installed to monitor flow from the production wells to the treatment facility, and from the treatment facility to the injection well manifold. Each injection well is also equipped with a flow totalizer.

Three conductivity meters are provided in the groundwater remediation system to monitor the conductivities of the recovery well water, the production well water, and the blended recovery and production well water. These conductivity meters were installed at the recovery well manifold, the production well manifold, and in the influent line to the 300,000-gallon storage tank downgradient of the static in-line mixer.

A water level gauge is provided for the 300,000-gallon storage tank to allow monitoring of water level inside the tank. Daily rainfall at the site is documented using an on-site rain gauge.

Flow Readings

Table 4-1 presents the flow meter readings on May 1, 1998 and June 15, 1999. As shown in Table 4-2, the volumes of groundwater withdrawn from the recovery and production wells during the subject period equaled 4.2 and 22.2 million gallons, respectively. The computed average flow rates during this period are also provided in Table 4-1. The total flow rates for the recovery wells and the production wells averaged 7.7 and 37.7 gpm, respectively.

The flow meter that measures flow from the recovery and production wells to the 300,000-gallon storage tank recorded a flow quantity of 23.7 million gallons between May 1, 1998 and June 15, 1999. Another flow totalizer documented 4.2 million gallons of production well water to the treatment unit. Thus, the combined flow equaled 27.9 million gallons, which is approximately 5 percent greater than the total volume of groundwater removed from the aquifer by the recovery and production wells during the same period. The difference is attributed to the general accuracy of the flow meters/totalizers. The flow meters/totalizers installed at the site have an accuracy of ±10 percent.

Between May 1, 1998 and June 15, 1999, the flow totalizer for the 500-gallon surge tank recorded approximately 4.4 million gallons of water going from the treatment unit to the injection well manifold, which is approximately 4 percent greater than the flow volume recorded by the flow totalizer installed between the production well manifold and the treatment unit. The difference is also within the expected range of accuracy for the flow totalizers.

The flow volume from the 500-gallon surge tank to the injection well manifold between May 1, 1998 and June 15, 1999 was 4.4 million gallons. This is in good agreement with the combined reading from the flow totalizers for the injection wells, which registered a combined injection flow quantity of approximately 4.3 million gallons. As shown in Table 4-1, the injection flow rates averaged approximately 7 to 8 gpm.

Two of the shallow recovery wells (RW-4 and RW-7) have been deactivated since December 19, 1998 because the groundwater samples from these two wells consistently met the extraction standards for sodium, radium (226+228) and gross alpha. RW-4 is located in the northwestern part of the shallow groundwater plume; RW-7 is located inside the eastern edge of the plume.

As indicated in the first annual report, two of the shallow injection wells (IW-1 and IW-4) and one of the deep injection wells (DI-2) had sodium concentrations close to or exceeding 160 mg/l, suggesting that these injection wells might be located at or inside the edges of the groundwater plumes. Accordingly, these wells have never been used since the groundwater remediation system was placed in operation. One of the shallow injection wells (IW-1), however, was activated in March 1999, after a water sample collected from this well in December 1998 had a measured sodium concentration of 128 mg/l, indicating that the plume edge has drawn back inside this injection well location. However, the other two injection wells (IW-4 and DI-2) were not activated because the sodium concentrations in these two wells remained above 160 mg/l.

Rainfall Data

Table 4-2 summarizes the daily rainfall documented between May 1998 and June 1999 using an on-site rain gauge. The annual rainfall between May 1998 and April 1999 was calculated to be 56.2 inches, which is 2.7 inches above the normal year rainfall of 53.5 inches based on the 1953 to 1994 rainfall records compiled by the National Oceanic and Atmospheric Administration (NOAA) at the nearby Canal Point USDA climatological station.

Conductivity Readings

The conductivity of the water provides an indication of water quality in the field. Based on historic groundwater quality data documented at the Indiantown Mill site, the extraction and discharge standards for sodium, radium (226+228) and gross alpha would not be violated if the specific conductance of the blended recovery and production well water (i.e., the water for irrigation on the spray field) is maintained below 1,000 µmhos/cm.

Table 4-3 presents the conductivity readings of the recovery well water, the production well water, and the blended water documented between May 1998 and June 1999. These readings were taken from conductivity meters that monitor the recovery well water and production well water at the manifolds, and the blended water after the recovery and production well water passed through the in-line mixer.

As shown in Table 4-3, the conductivities of groundwater from the recovery and production wells remained relatively constant. During the subject period, the conductivities of the recovery well water ranged from 1,890 to 2,900 µmhos/cm and averaged 2,663 µmhos/cm, which indicated that the groundwater likely exceeded the extraction and discharge standards. The clean water from the production wells, which are located within the spray field area upgradient of the groundwater plumes, had conductivity readings ranging from 540 and 560 µmhos/cm and averaging 543 µmhos/cm. The conductivity of the blended water, with a recovery to production well water ratio of approximately 1:4.5, ranged from 810 to 1,010 µmhos/cm and averaged 948 µmhos/cm during the subject period.

Sampling of Recovery and Production Wells

In addition to the field conductivity readings, routine monitoring of the groundwater remediation and spray irrigation system included recovery and analyses of: (i) composite samples of the production well water before passing through the iron treatment and filtration unit for iron and TSS analyses, (ii) composite samples of the production well water after passing through the iron treatment and filtration unit for iron and TSS analyses, (iii) individual samples of the recovery well water for conductivity, sodium, radium (226+228) and gross alpha analyses, and (iv) individual samples of the 300,000-gallon storage tank effluent (i.e., the irrigation water that would be on the 40-acre spray field) for sodium, conductivity, radium (226+228) and gross alpha analyses. These water samples were collected by the AmeriSteel employee from sampling ports installed within the treatment facility. Analyses for radionuclides were performed by Pembroke Laboratories, Inc. All other chemical analyses were performed by Everglades Laboratories, Inc.

Sampling of the production and recovery wells was performed on four occasions between May 1998 and June 1999. Results of laboratory analyses on these remediation well samples are summarized in Tables 4-4 through 4-8. As shown, the composite samples of groundwater from the production wells exhibited very low TSS and iron concentrations even before the combined flow passed through the iron treatment and filtration unit. The average conductivities of the recovery well water samples varied in the general range of approximately 1,500 to 2,000 µmhos/cm, which were slightly lower than the field conductivity readings for the combined flow from all the recovery wells.

Although all recovery wells had sodium concentrations greater than 160 mg/l during the startup and testing program in February 1997, the water samples from RW-4 and RW-7 consistently met the groundwater extraction standards for sodium, radium (226+228) and gross alpha in all four sampling events between May 1998 and June 1999. Thus, RW-4 and RW-7 were deactivated in December 1998. RW-4 is located in the northwestern part of the shallow groundwater plume; RW-7 is located inside the eastern edge of the plume. Except for RW-4 and RW-7, the water samples from all other recovery wells consistently exceeded the extraction standard of 160 mg/l for sodium. The average measured sodium concentrations in all active recovery wells were within the general range of 300 to 500 mg/l, approximately two to three times greater than the groundwater extraction standards. In the March 30, 1999 sampling event, the average sodium concentration from all the active recovery wells was 418 mg/l. The highest sodium concentrations typically occurred at RW-5, which is located near the center of the shallow groundwater plume. In the March 30, 1999 sampling event, the water sample from RW-5 had a sodium concentration of 643 mg/l, which was four times greater than the extraction standard.

Radium (226+228) and gross alpha concentrations exceeded the extraction standards consistently in DR-1 and RW-1, and occasionally in the water samples from other active remediation wells.

Sampling of Storage Tank Effluent

Sampling of the 300,000-gallon storage tank effluent was performed on ten occasions between May 1998 and June 1999. Results of laboratory analyses of these water samples, which are representative of the quality of the irrigation water applied to the spray field, are summarized in Table 4-9. As shown, all the water samples met the discharge standards for sodium, radium (226+228), and gross alpha. The conductance of the water samples was typically in the general range of 800 to 1,000 µmhos/cm with an average conductivity value of 926 µmhos/cm, which is consistent with the field conductivity readings for the blended recovery and production well water shown in Table 4-3. The sodium concentrations in the effluent samples were all below 115 mg/l, which met the discharge standard of 160 mg/l stipulated in the ROD.

Sampling of Injection Wells

During the startup and testing program of the groundwater remediation system, the water samples from two of the shallow injection wells (IW-1 and IW-4) and one of the deep injection wells (DI-2) had sodium concentrations close to or exceeding 160 mg/l, which indicated that these injection wells might be located close to the edge of the groundwater plume. Therefore, these injection wells were not activated until the plume edge was drawn back inside these injection well locations.

A water sample was collected from each of these three injection wells on December 4, 1998. The results are summarized in Table 4-10. As shown, IW-1 had a measured sodium concentration of 128 mg/l, which is below the extraction standard for sodium. However, IW-4 and DI-2 remained above 160 mg/l with sodium concentrations of 616 and 222 mg/l, respectively. IW-1 was eventually activated in March 1999. The other two injection wells will be activated when the edge of the plume is drawn back inside these injection well locations.

Sampling of Monitor Wells

In addition to routine sampling and testing of the groundwater remediation and spray irrigation system, the following monitor wells were sampled by Everglades Laboratories between December 22, 1998 and January 12, 1999 for analyses of sodium, radium (226+228), gross alpha and conductivity:

- A sample each from MW-1, MW-5 and MW-6 to monitor groundwater quality at the base of the shallow aquifer beneath the spray field.

- A sample from each of MW-3 and MW-4 to monitor groundwater quality at the base of the shallow aquifer downgradient of the spray field at the AmeriSteel property boundary.

- A sample from each of M-19, M-25, M-50, M-52 and M-96 to monitor changes in groundwater quality within the shallow groundwater plume.

- A sample from M-90 to monitor changes in groundwater quality upgradient of the shallow groundwater plume.

- A sample from M-65, M-67 and M-68 to monitor changes in groundwater quality outside the shallow groundwater plume.

- A sample from MW-2 to monitor groundwater quality in the deep aquifer beneath the spray field.

- A sample from each of M-73, M-76, M-80, M-81, M-94 and M-95 to monitor changes in groundwater quality within the deep groundwater plume.

- A sample from each of M-86, M-87 and M-91 to monitor changes in groundwater quality upgradient of the deep groundwater plume.

- A sample from each of M-22 and M-40 to monitor changes in groundwater quality downgradient of the deep groundwater plume.

Results of analytical testing of the monitor well samples are summarized in Table 4-11. The measured sodium concentrations in the shallow and deep aquifers are further depicted in Figures 2 and 3, respectively. As expected, sodium, radium (226+228) and gross alpha remained above the extraction standards within the shallow and deep groundwater plume boundaries delineated during the Remedial Design. In the shallow aquifer, the groundwater samples obtained from M-19, M-25, M-50 and M-52 did not meet the extraction standards. In the deep aquifer, the groundwater samples recovered from M-22, M-73, M-80, M-81 and M-95 were also above the extraction standards.

A comparison of sodium concentrations in the previously existing monitor wells (i.e., the M-series wells) in July 1995 (i.e., prior to construction of the groundwater remediation system), November/December 1997 (i.e., approximately six months after activation of the groundwater remediation system), and the latest sampling event in December 1998/January 1999 (i.e., approximately 18 months after activation of the groundwater remediation system) is presented in Table 4-12.

As in previous sampling events, the groundwater samples from the five shallow monitor wells installed outside the shallow plume boundary (i.e., M-65, M-67, M-68, M-90 and M-96) continued to have low sodium concentrations in the most recent sampling event, indicating that the shallow plume has not expanded or migrated in any direction. For the four wells that are located inside the shallow plume boundary (i.e., M-19, M-25, M-50 and M-52), the sodium concentrations in M-19, M-25 and M-52 have decreased, but the sodium concentration in M-50 has increased slightly in the most recent sampling event.

A total of 12 deep aquifer wells were sampled in the most recent sampling event. Sodium concentrations exceeding the extraction standards were detected in M-22, M-73, M-80, M-81, and M-95. Except in M-81, the sodium concentrations were all lower than those documented in the previous sampling event. The groundwater sample from M-81, which is located on the north side of the deep plume, had sodium concentrations of 109 mg/l in July 1995 and 442 mg/l in November/December 1997. In the most recent sampling event in December 1998/January 1999, the sodium concentration increased to 566 mg/l. This can be attributed to the fact that M-81 is located between the deep recovery well (DR-1) and M-80, which historically had high sodium concentrations.

As shown in Table 4-11, all newly installed monitor wells (i.e., the MW-series wells) met the groundwater extraction and discharge standards.

Soil Sampling and Analyses

Ten soil samples were collected by AmeriSteel from the upper 6 inches of the soil profile within the 40-acre spray field in August 1999 to address the concern of the Florida Department of Environmental Protection (FDEP) regarding potential accumulation of radionuclides in the near-surface soil as a result of spray irrigation of the blended water from the recovery and production wells. FDEP had previously recommended a soil action level of 5 pCi/gm for radium 226 within the upper 6 inches of the soil profile.

The soil samples were collected from different locations of the spray field parcels to provide relatively uniform coverage. Three soil samples (designated A1 through A3) were collected from Spray Field A, two soil samples (designated B1 and B2) from Spray Field B, and five soil samples (designated C1 through C5) from Spray Field C. These soil samples were analyzed for radium 226, radium 228 and sodium. Analyses for radium 226 and 228 were performed by Pembroke Laboratories, Inc., based on EPA Method 903.1 and the Brooks and Blanchard Method, respectively. Analyses for sodium were performed by Everglades Laboratories, Inc., based on EPA Method 7770.

Results from analyses of the soil samples recovered from the spray field are summarized in Table 4-13 along with the background concentrations established from samples obtained from approximately the same locations in August 1996, after construction of the spray field, and in June 1998, after approximately one year of operation.

As shown in Table 4-13, the soil samples from the spray field exhibited very low radium 226 and 228 concentrations. The radium 226 concentrations were less than 1.6±0.1 pCi/gm, and the radium 228 concentrations less than 1.7±0.5 pCi/gm. Prior to operation of the spray field, the sodium concentrations in the soil samples ranged from 9.9 to 118 mg/kg and averaged 34 mg/kg. After the spray field has been activated for over two years, the average sodium concentrations in the soil samples increased slightly to approximately 45 mg/kg.

Based on the above test data, there is no clear evidence of any significant accumulation of radionuclides in the near-surface soil within the spray field. After two years of operation, the radium 226 concentrations in the spray field soil samples remained well below the soil action level of 5 pCi/gm proposed by the FDEP. However, the near-surface soils in the spray field did appear to have a slight increase in sodium concentrations.

Conclusions

Based on the performance monitoring data documented between May 1998 and June 1999, the following observations were made:

- The groundwater remediation and spray irrigation system remained fully functional.

- IW-1 was placed into operation on March 17, 1999, after it was confirmed that the edge of the shallow groundwater plume had been drawn inside this injection well location.

- IW-4 and DI-2 remained de-activated because the sodium concentrations in these two wells remained above 160 mg/l.

- RW-4 and RW-7 were deactivated on December 19, 1998, after groundwater samples from these two wells consistently met the extraction standards.

- As of June 1999, after approximately two years of operation, a total of approximately 6.3 million gallons of groundwater was removed from the shallow and deep recovery wells, and 36.0 million gallons of groundwater was removed from the production wells. During the same period, approximately 37.8 million gallons of the blended water was applied to the 40-acre spray field, and 6.5 million gallons of the production well water was applied to the injection wells.*

- Sodium, radium (226+228) and gross alpha remained above the extraction standards for most of the wells located inside the groundwater plume areas.

- The blended recovery and production well water applied on the spray field consistently met the discharge standards for sodium, radium (226+228) and gross alpha.

* The slight discrepancy in flow balance is probably due to the accuracy of the flow meters.

- A review of the recent water level readings obtained by AmeriSteel in January 2000 indicated that the entire shallow groundwater plume delineated during the Remedial Design remained encompassed by the cone of depression created by the shallow recovery wells.

- The size of the deep groundwater plume appears to be larger than what was expected during the Remedial Design.

- A mixing ratio of approximately 1:4.5 between the recovery and production well water was conservative.

- The groundwater at the downgradient property boundary met the discharge standards.

- There was no clear evidence of any significant accumulation of radionuclides in the near-surface soil within the spray field.

Ardaman & Associates, Inc., is working with AmeriSteel to improve the efficiency of the system and the data collection effort. Improvements that are currently under consideration are: (i) decreasing the recovery to production well water mixing ratio from 1:4.5 to 1:3.0; (ii) activating IW-4 and DI-2 if the sodium concentrations drop below 160 mg/l; (iii) pumping IW-4 and DI-2 to remove the impacted groundwater at these locations if the sodium concentrations remain above 160 mg/l; and (iv) reducing the routine test frequencies, especially for radionuclides in the recovery well water samples and in the annual monitor well samples from outside the groundwater plume boundaries.

The third annual groundwater monitoring report is scheduled to be completed in December, 2000.

VI. Assessment

The results of remedial action are contained in Section IV, Paragraph "C", Subparagraph "Remedial Action." As discussed in that section, the remedial objectives were effectively addressed by each of the major components of remedial action.

In summary:

<u>OU-1</u>

1. Contaminated soil and sediment has been effectively treated through on-site solidification/stabilization. At present, the surficial cover of the landfill is in excellent condition and remains effective in protecting stabilized/solidified material from degradation. Although the potential for contaminant leaching is very low (based on the adequacy of the protective vegetative cover, the results of performance tests, and in-situ permeability testing), continued annual groundwater monitoring should be conducted to confirm that leaching is not occurring.

<u>OU-2</u>

1. The excavation criteria for wetlands of 160 mg/kg for lead has been met. EPA and FDEP have granted final approval.

2. The groundwater ARAR's for the groundwater remediation are being met. The groundwater system captures all groundwater with contaminants above the MCLs, but it will take approximately 7-10 years before MCLs are satisfied within the area of the groundwater plume. The remediation efforts to address the groundwater plume should continue.

Radium and gross alpha were not included in the original requirements for surface water discharge monitoring. However, in January 2000, the PRP agreed to analyze samples of runoff from the sprayfield for these constituents. Also, soil in the sprayfield is sampled periodically for sodium and radium in order to evaluate whether there is any accumulation of those contaminants.

<u>Adequacy of O&M</u>

The plan for continued O&M activities is judged to be adequate at this time.

VII. Deficiencies

The following minor deficiencies were discovered during the Five-Year Review. These deficiencies are not judged to affect the current protectiveness of the remedy, but should be addressed in order to ensure long-term protectiveness, or to satisfy procedural requirements.

A. The entrance gate to the site was unlocked at the time of the site visit and there was no visible signage depicting that the site was a Superfund Site.

B. The 1998 Annual Report for the Groundwater Remediation for OU-2 indicates that groundwater contaminant levels have not yet met the MCL ARAR levels. However, the remedy is still operational and remediation of groundwater to meet Federal and State MCLs for radium and sodium is still in progress.

VIII. Recommendations

The following recommendations are made to address the deficiencies noted above:

A. The site gate should remain locked and appropriate signage should be installed at the site.

B. Continue remediation of groundwater until Federal and State MCLs for radium and sodium are met.

IX. Protectiveness Statement

The selected remedy, as executed, currently remains protective of human health and the environment. Continued site inspections, groundwater remediation, and groundwater monitoring should be conducted to ensure long-term protectiveness.

X. Next Review

This is a statutory site that requires ongoing five-year reviews as long as hazardous substances, pollutants, or contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure. The presence of the landfill, which contains elevated concentrations of lead, cadmium, and zinc (characteristically non-hazardous in its present stabilized form), prohibits unlimited use of that portion of the site. Therefore, ongoing 5-year reviews are required EPA Region IV should conduct the next review within five years of the signature date of this report.

TABLES

Table 1 - Chronology of Site Events for OU-1

Event	Date
FSC operates as steel mill.	1970 to 1982
The Work Plan for PCB sampling was completed.	1983
The PCB Sampling Report was completed.	1984
The PCB Remedial Action Plan was completed.	1985
The PCB-contaminated soils were excavated and treated by incineration on site.	1986
The Completion Report for PCB excavation was completed.	1986
Negotiations between EPA, FDEP and AmeriSteel began in 1987.	1987
The Remedial Investigation/Feasibility Study Work Plan was completed.	1988
The Phase I Remedial Investigation for the site was completed.	1988
The Phase II Remedial Investigation for the site was completed.	1989
The Feasibility Study was completed in 1992.	1992
The Consent Decree for Remedial Design/Remedial Action was executed.	1993
The Remedial Design Work Plan was completed.	1993
The Remedial Design was completed.	1994
The Remedial Action Work Plan was completed.	1994
Remediation at the site began in January 1995 and ended in May 1996.	1995 to 1996
The Remedial Action Report was completed.	1996

Table 2 - Chronology of Site Events for OU-2

Event	Date
The Feasibility Study Report was issued	November 23, 1993
The Remedial Design Work Plan was submitted to the EPA	January 16, 1995
The Remedial Design was completed and submitted to the EPA	February 15, 1996
The Remedial Action Work Plan was submitted to the EPA	February 15, 1996
The Performance Standards Verification Plan was submitted to the EPA	February 15, 1996
Installation of the groundwater remediation system	April 1996 - January 1997
The groundwater remediation system was tested	February 4 and 5, 1997
The groundwater remediation system was inspected by EPA and FDEP	February 18, 1997
The groundwater remediation system was approved for operation by EPA	April 1, 1997
The groundwater remediation system was officially activated for full scale operation	April 24, 1997

Table 3
Summary of Surface Water Quality Data

1997 Surface Water Quality Data

Sample Number	Sampling Data	Sampling Time	Temp Degrees C	pH (units)	Conductivity µmho/cm	Turbidity (NTU)	Hardness mg/l	Lead µg/l	Zinc µg/l	Standards	
										Lead	Zinc
SW-1	07/21/97	07:51	25	7.4	120	1.46	39.6	< 3	52	1.0	48
SW-2	07/26/97	19:05	29	7.8	210	1.68	65.0	< 3	26	1.8	74
SW-3	08/11/97	18:31	25	7.1	200	1.61	74.2	8	54	2.2	82
SW-3	08/17/97	10:32	24	7.1	200	2.10	84.5	11	51	2.6	92
SW-5	08/27/97	09:10	24	6.9	200	0.93	73.9	< 3	96	2.2	82
SW-6	09/05/97	18:10	24	7.0	210	2.04	76.8	30	< 20	2.3	85
SW-7	09/13/97	17:34	28	7.1	200	1.82	75.1	< 3	< 20	2.2	83
SW-8	09/27/97	09:02	25	7.1	200	2.25	77.9	4	< 20	2.3	86

1998 Surface Water Quality Data

Sample Number	Sampling Data	Sampling Time	Temp Degrees C	pH (units)	Conductivity µmho/cm	Turbidity (NTU)	Hardness mg/l	Lead µg/l	Zinc µg/l	Standards	
										Lead	Zinc
SW-1	2/4/98	10:20	20	7.1	260	3.25	-	9.6	20	-	-
SW-2	2/17/98	9:06	22	6.9	200	4.66	-	< 5	27	-	-
SW-3	2/24/98	8:45	20	6.9	210	2.87	-	5.7	22	-	-
SW-4	3/20/98	9:25	18	7.1	210	3.62	-	9.6	< 20	-	-
SW-5	8/12/98	9:28	32	6.7	210	1.06	72.0	9.5	< 20	2.1	80
SW-6	8/17/98	10:21	30	6.9	210	1.15	68.8	< 5	< 20	2.0	77
SW-7	8/24/98	9:10	26	6.6	210	1.22	75.8	< 5	< 20	2.2	84
SW-8	9/11/98	11:31	26	6.9	220	0.70	76.9	< 5	< 20	2.3	85
SW-9	9/17/98	10:05	26	6.9	210	0.99	79.6	< 5	52	2.4	87
SW-10	9/24/98	8:45	28	7.0	130	2.51	46.2	< 5	52	1.3	57
SW-11	10/1/98	8:30	24	6.6	210	1.42	71.4	12	80	2.1	80
SW-12	11/6/98	9:15	24	6.5	160	1.19	64.4	< 5	< 20	1.8	73
Average	**-**	**-**	**25**	**6.8**	**203**	**2.10**	**69.6**	**5.3**	**22.3**	**2.0**	**78**
Average In 1997	**-**	**-**	**26**	**7.2**	**193**	**1.74**	**70.9**	**8.0**	**39.0**	**2.1**	**79**

1999 Surface Water Quality Data

Sample Number	Sampling Data	Sampling Time	Temp Degrees C	pH (units)	Conductivity µmho/cm	Turbidity (NTU)	Hardness mg/l	Lead µg/l	Zinc µg/l	Standards	
										Lead	Zinc
SW-1	09/02/99	10:05	26	7.6	150	2.86	101.8	< 5	< 30	3.3	
SW-2	09/09/99	09:45	26	7.6	270	1.63	103.5	< 5	< 30	3.3	
SW-3	10/17/99	11:05	24	7.5	280	2.14	102.9	< 5	< 30	3.3	

Table 4
Summary of Groundwater Quality Data

Table 4-1
Flow Quantities Between May 1, 1998 and June 15, 1999

Station	Flow Readings 05/01/98	Flow Readings 06/15/99	Flow Quantity (gallons)	Flow Rate (gpm)
• **Recovery Wells**				
Flow Totalizer for RW-1	454,982	1,448,724	993,742	1.68
Flow Totalizer for RW-2	181,614	773,178	591,564	1.00
Flow Totalizer for RW-3	150,589	502,136	351,547	0.60
Flow Totalizer for RW-4	204,452	Off	119,311*	0.37
Flow Totalizer for RW-5	208,793	688,062	479,269	0.81
Flow Totalizer for RW-6	257,394	786,547	529,153	0.90
Flow Totalizer for RW-7	410,477	Off	264,856*	0.83
Flow Totalizer for DR-1	419,504	1,322,941	903,437	1.53
Total Flow from Recovery Wells	-	-	4,232,879	7.72
• **Production Wells**				
Flow Totalizer for PW-1	2,972,965	7,357,240	4,384,275	7.43
Flow Totalizer for PW-2	2,860,875	7,335,548	4,474,673	7.58
Flow Totalizer for PW-3	2,988,945	7,406,702	4,417,757	7.48
Flow Totalizer for PW-4	2,920,176	7,406,200	4,486,024	7.60
Flow Totalizer for PW-5	3,057,765	7,538,357	4,480,592	7.59
Total Flow from Production Wells	-	-	22,243,321	37.68
• **Storage Tank, Treatment Unit and Surge Tank**				
Flow Meter for all Recovery & Production Wells to 300,000-Gallon Tank	15,255,022	38,994,038	23,739,016	40.21
Flow Totalizer for all Production Wells to Treatment Unit	2,501,335	6,705,150	4,203,815	7.12
Flow Totalizer for 500-Gallon Surge Tank to Injection Well Manifold	2,557,930	6,929,023	4,371,093	7.40
• **Injection Wells**				
Flow Totalizer to IW-1	Off	175,730	173,535**	1.34
Flow Totalizer to IW-2	400,752	1,094,263,	693,511	1.17
Flow Totalizer to IW-3	390,154	1,016,650	626,496	1.06
Flow Totalizer to IW-4	Off	Off	Off	Off
Flow Totalizer to IW-5	259,087	746,402	487,315	0.83
Flow Totalizer to IW-6	159,470	432,674	273,204	0.46
Flow Totalizer to IW-7	113,166	264,578	151,412	0.26
Flow Totalizer to IW-8	67,594	198,824	131,230	0.22
Flow Totalizer to IW-9	151,207	401,315	250,108	0.42
Flow Totalizer to IW-10	231,880	527,377	295,497	0.50
Flow Totalizer to IW-11	242,053	647,897	405,844	0.69
Flow Totalizer to DI-1	486,495	1,267,306	780,811	1.32
Flow Totalizer to DI-2	Off	Off	Off	Off
Total Flow to Injection Wells	-	-	4,268,963	8.27

* Flow quantity through December 19, 1998, when the well was deactivated.
** Flow quantity between March 17, 1999 (when the well was activated) and June 15, 1999.

Table 4-2

Daily Rainfall Records

Day	Rainfall (inches)													
	05/98	06/98	07/98	08/98	09/98	10/98	11/98	12/98	01/99	02/99	03/99	04/99	05/99	06/99
1	1.12	-	-	-	0.15	-	-	-	-	0.38	-	-	-	0.08
2	-	-	-	-	0.44	-	-	0.06	0.45	0.15	0.40	-	-	0.11
3	-	-	-	-	0.60	-	-	-	1.35	-	-	-	-	0.30
4	-	-	-	1.75	-	-	-	0.13	0.13	-	-	-	-	-
5	0.90	-	-	0.04	-	-	9.00	-	-	-	-	-	-	-
6	-	-	-	0.66	0.90	-	0.15	-	-	-	-	-	-	0.27
7	-	-	1.35	1.40	-	-	-	-	-	-	-	-	-	4.34
8	-	0.42	-	0.24	0.16	-	-	-	-	-	-	-	0.30	0.52
9	-	-	-	0.02	0.04	-	-	-	-	-	-	-	0.15	-
10	-	0.03	-	-	0.80	-	0.05	-	0.05	-	-	-	-	0.04
11	0.04	-	0.52	2.30	0.50	-	-	-	-	-	-	-	0.70	-
12	-	-	0.34	-	-	0.75	-	-	-	1.50	-	-	0.28	-
13	-	-	0.12	-	-	0.11	-	0.70	-	-	-	-	-	-
14	-	-	0.30	-	-	-	-	0.17	0.06	-	0.25	-	-	-
15	-	-	0.13	-	0.17	-	-	-	-	-	0.05	-	-	1.25
16	-	-	0.54	1.65	0.90	-	-	-	-	-	-	-	-	0.60
17	-	-	-	-	0.18	-	-	-	-	-	-	0.23	-	0.30
18	-	-	-	0.03	1.20	-	-	-	-	-		-	-	2.00
19	-	-	-	-	-	-	-	-	-	-	-	-	-	0.60
20	-	1.15	0.21	0.05	0.60	0.80	0.50	-	-	-	-	-	-	-
21	-	1.50	0.20	0.68	1.45	0.11	0.03	-	-	-	-	-	1.00	0.68
22	-	-	0.26	0.80	0.07	0.20	-	-	-	-	-	-	0.60	-
23	-	-	-	0.38	-	-	-	0.05	-	-	-	-	-	0.24
24	-	1.90	-	0.08	0.07	-	-	-	1.15	-	-	-	-	0.09
25	-	-	-	-	0.78	0.02	0.62	-	-	-	-	-	-	1.10
26	-	2.55	0.06	-	1.85	-	-	-	-	-	-	-	-	0.27
27	-	-	-	-	-	0.03	-	-	-	-	-	0.02	-	0.08
28	0.07	-	-	-	-	-	-	0.08	-	-	-	0.28	-	0.70
29	-	-	-	-	-	-	-	0.04	-	-	-	0.32	-	0.15
30	0.34	-	-	-	-	-	-	-	-	-	-	0.06	0.34	0.20
31	0.80	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	3.27	7.55	4.03	10.08	10.86	2.02	10.35	1.23	3.19	2.03	0.70	0.91	3.37	13.92

Table 4-3

Conductivity Meter Readings

Date	Conductivity Meter Readings (µmhos/cm)		
	Combined Flow from All Recovery Wells	Combined Flow from All Production Wells	Combined Flow of Recovery and Production Wells after Mixing
05/01/98	2,300	550	840
05/05/98	2,400	550	870
05/07/98	2,400	550	880
05/11/98	2,500	550	890
05/17/98	2,300	560	870
06/21/98	2,300	560	880
06/23/98	2,300	560	880
07/24/98	1,890	540	810
07/31/98	2,200	540	850
11/30/98	2,100	540	810
12/02/98	2,200	540	820
12/07/98	2,400	540	850
12/21/98	2,900	540	980
12/22/98	2,900	540	990
12/23/98	2,900	540	990
12/24/98	2,900	540	990
01/14/99	2,900	550	1000
02/08/99	2,900	550	990
02/10/99	2,900	550	1010
03/24/99	2,700	540	970
03/27/99	2,700	540	970
03/30/99	2,800	540	970
04/11/99	2,800	540	980
04/13/99	2,800	540	990
04/16/99	2,800	540	970

Table 4-4
Conductivity Meter Readings
(continued)

Date	Conductivity Meter Readings (µmhos/cm)		
	Combined Flow from All Recovery Wells	Combined Flow from All Production Wells	Combined Flow of Recovery and Production Wells after Mixing
04/18/99	2,700	540	950
04/20/99	2,800	540	990
04/22/99	2,800	540	990
04/26/99	2,800	540	990
04/28/99	2,700	540	980
04/30/99	2,800	540	960
05/02/99	2,800	540	980
05/04/99	2,800	540	970
05/06/99	2,900	540	980
05/08/99	2,800	540	990
05/10/99	2,800	540	990
05/15/99	2,800	540	950
05/17/99	2,800	540	990
05/20/99	2,800	540	990
05/22/99	2,800	540	990
05/24/99	2,800	540	990
05/31/99	2,800	540	990
06/04/99	2,800	540	1000
06/06/99	2,700	540	990
Average	2,663	543	948

Table 4-5

Results of Sampling on May 6, 1998

Sample Designation	Conductance (µmhos/cm) EPA 120.1	TSS (mg/l) EPA 160.2	Iron (mg/l) EPA 7380	Sodium (mg/l) EPA 7770	Radium 226 (pCi/l) EPA 903.1	Radium 228 (pCi/l) B & B	Gross Alpha (pCi/l) EPA 900
• **Composite Sample from Production Wells**							
Composite Influent	-	1	0.200	-	-	-	-
• **Composite Sample from Production Wells after Iron Treatment and Filtration**							
Composite Effluent	-	1	0.080	-	-	-	-
• **Samples from Recovery Wells**							
DR-1	3,780	-	-	536	11.5 ± 0.4	1.3 ± 0.5	47 ± 33
RW-1	2,940	-	-	542	15.8 ± 0.5	1.7 ± 0.5	18 ± 22
RW-2	1,481	-	-	255	2.1 ± 0.2	1.2 ± 0.5	9 ± 6
RW-3	993	-	-	168	2.0 ± 0.2	1.0 ± 0.5	5 ± 3
RW-4	958	-	-	130	2.5 ± 0.2	1.6 ± 0.5	8 ± 4
RW-5	3,757	-	-	755	6.1 ± 0.2	2.4 ± 0.5	1 ± 20
RW-6	1,471	-	-	219	5.1 ± 0.3	0.7 ± 0.5	16 ± 6
RW-7	571	-	-	101	0.9 ± 0.1	0.5 ± 0.5	3 ± 3

Note: The shaded values indicate that the extraction and discharge standards were exceeded.

Table 4-6

Results of Sampling on July 24, 1998

Sample Designation	Conductance (µmhos/cm) EPA 120.1	TSS (mg/l) EPA 160.2	Iron (mg/l) EPA 7380	Sodium (mg/l) EPA 7770	Radium 226 (pCi/l) EPA 903.1	Radium 228 (pCi/l) B & B	Gross Alpha (pCi/l) EPA 900
• **Composite Sample from Production Wells**							
Composite Influent	-	1	0.048	-	-	-	-
• **Composite Sample from Production Wells after Iron Treatment and Filtration**							
Composite Effluent	-	1	0.155	-	-	-	-
• **Samples from Recovery Wells**							
DR-1	2,219	-	-	320	-	-	-
RW-1	2,659	-	-	500	-	-	-
RW-2	1,451	-	-	284	-	-	-
RW-3	903	-	-	183	-	-	-
RW-4	724	-	-	127	-	-	-
RW-5	3,456	-	-	699	-	-	-
RW-6	1,336	-	-	246	-	-	-
RW-7	495	-	-	93	-	-	-

Note: The shaded values indicate that the extraction and discharge standards were exceeded.

Table 4-7

Results of Sampling on December 23, 1998

Sample Designation	Conductance (µmhos/cm) EPA 120.1	TSS (mg/l) EPA 160.2	Iron (mg/l) EPA 7380	Sodium (mg/l) EPA 7770	Radium 226 (pCi/l) EPA 903.1	Radium 228 (pCi/l) B & B	Gross Alpha (pCi/l) EPA 900
• **Composite Sample from Production Wells**							
Composite Influent	-	2	0.020	-	-	-	-
• **Composite Sample from Production Wells after Iron Treatment and Filtration**							
Composite Effluent	-	1	0.060	-	-	-	-
• **Samples from Recovery Wells**							
DR-1	1,467	-	-	735	6.1 ± 0.3	< 0.5 ± 0.5	28 ± 36
RW-1	2,811	-	-	543	11.6 ± 0.4	< 0.5 ± 0.5	20 ± 12
RW-2	1,617	-	-	304	3.0 ± 0.2	< 0.5 ± 0.5	18 ± 8
RW-3	1,030	-	-	218	2.4 ± 0.2	< 0.5 ± 0.5	5 ± 5
RW-4	883	-	-	151	2.0 ± 0.2	< 0.5 ± 0.5	8 ± 5
RW-5	1,354	-	-	746	5.6 ± 0.3	< 0.5 ± 0.5	15 ± 12
RW-6	483	-	-	279	0.5 ± 0.1	< 0.5 ± 0.5	6 ± 3
RW-7	184	-	-	102	0.9 ± 0.2	< 0.5 ± 0.5	4 ± 3

Note: The shaded values indicate that the extraction and discharge standards were exceeded.

Table 4-8

Results of Sampling on March 30, 1999

Sample Designation	Conductance (µmhos/cm) EPA 120.1	TSS (mg/l) EPA 160.2	Iron (mg/l) EPA 7380	Sodium (mg/l) EPA 7770	Radium 226 (pCi/l) EPA 903.1	Radium 228 (pCi/l) B & B	Gross Alpha (pCi/l) EPA 900
• **Composite Sample from Production Wells**							
Composite Influent	-	< 1	0.060	-	-	-	-
• **Composite Sample from Production Wells after Iron Treatment and Filtration**							
Composite Effluent	-	< 1	< 0.05	-	-	-	-
• **Samples from Recovery Wells**							
DR-1	4,019	-	-	655	10.7 ± 0.3	1.0 ± 0.5	73 ± 63
RW-1	2,586	-	-	495	5.7 ± 0.3	0.8 ± 0.5	27 ± 20
RW-2	1,547	-	-	288	3.2 ± 0.2	< 0.5 ± 0.5	< 1 ± 9
RW-3	990	-	-	187	2.1 ± 0.2	< 0.5 ± 0.5	3 ± 6
RW-4	472	-	-	79	1.5 ± 0.1	< 0.5 ± 0.5	10 ± 7
RW-5	3,083	-	-	643	0.2 ± 0.1	< 0.5 ± 0.5	9 ± 23
RW-6	1,345	-	-	242	4.5 ± 6.0	< 1.5 ± 0.5	11 ± 6
RW-7	467	-	-	88	0.4 ± 0.1	< 0.5 ± 0.5	2 ± 3

Note: The shaded values indicate that the extraction and discharge standards were exceeded.

Table 4-9

Water Quality of 300,000-Gallon Storage Tank Effluent

Date	Conductance (µmhos/cm)	Sodium (mg/l)	Radium 226 (pCi/l)	Radium 228 (pCi/l)	Gross Alpha (pCi/l)
05/06/98	840	81	2.1 ± 0.1	0.5 ± 0.5	3 ± 3
06/12/98	779	61	-	-	-
12/19/98	853	83	-	-	-
12/23/98	944	115	1.3 ± 0.1	0.9 ± 0.5	4 ± 4
01/17/99	987	91	-	-	-
03/30/99	892	99	2.2 ± 0.2	< 0.5 ± 0.5	3 ± 4
04/15/99	966	91	-	-	-
04/30/99	1,000	93	-	-	-
05/15/99	1,004	93	-	-	-
05/30/99	996	95	-	-	-
Average	926	90	-	-	-

Table 4-10

Sodium Concentrations in IW-1, IW-4 and DI-2 on December 4, 1998

Injection Well	Sodium Concentration (mg/l)
IW-1	128
IW-4	616
DI-2	222

Table 4-11

Water Quality Data of Monitor Well Samples

Well No.	Date of Sampling	pH (units)	Temp (°C)	Turbidity (NTU)	Conductance (µmhos/cm)	Sodium (mg/l)	Radium 226 (pCi/l)	Radium 228 (pCi/l)	Gross Alpha (pCi/l)
• **Shallow Aquifer Wells**									
MW-1	12/28/98	5.2	25.6	108.00	87	10.4	0.8 ± 0.1	< 0.5 ± 0.5	2 ± 3
MW-3	01/05/99	5.1	24.7	1.06	174	21.6	0.2 ± 0.1	< 0.5 ± 0.5	4 ± 3
MW-4	01/05/99	5.3	25.0	0.48	259	38.5	0.4 ± 0.1	< 0.5 ± 0.5	5 ± 3
MW-5	01/05/99	5.5	26.2	5.80	131	14.4	0.3 ± 0.1	< 0.5 ± 0.5	< 1 ± 2
MW-6	12/28/98	5.7	26.7	2.20	344	21.3	0.5 ± 0.1	< 0.5 ± 0.5	7 ± 3
M-19	01/08/99	7.2	22.8	0.69	3360	450.0	0.6 ± 0.1	< 0.5 ± 0.5	30 ± 35
M-25	01/08/99	4.3	23.8	1.00	2440	390.0	26.5 ± 0.1	< 0.5 ± 0.5	89 ± 49
M-50	12/22/98	5.2	25.4	2.50	1940	379.0	2.5 ± 0.2	< 0.5 ± 0.5	32 ± 10
M-52	01/05/99	4.1	23.8	0.74	1331	184.0	5.5 ± 0.2	< 0.5 ± 0.5	14 ± 5
M-65	12/22/98	4.6	24.2	4.00	333	24.4	0.7 ± 0.1	< 0.5 ± 0.5	3 ± 2
M-67	01/12/99	5.1	23.9	1.65	126	13.5	0.3 ± 0.1	< 0.5 ± 0.5	2 ± 2
M-67 (dup)	01/22/99	5.0	23.9	1.67	126	13.6	0.1 ± 0.1	< 0.5 ± 0.5	< 1 ± 2
M-68	12/22/98	4.7	24.3	4.70	74	6.1	< 0.1 ± 0.1	< 0.5 ± 0.5	2 ± 2
M-90	12/23/98	4.7	25.7	2.00	122	23.3	< 0.1 ± 0.1	< 0.5 ± 0.5	15 ± 4
M-96	01/05/99	4.7	24.1	1.70	194	31.9	0.3 ± 0.1	< 0.5 ± 0.5	2 ± 3
• **Deep Aquifer Wells**									
MW-2	01/05/99	7.5	24.8	4.10	557	15.2	0.9 ± 0.2	< 0.5 ± 0.5	7 ± 3
M-22	01/05/99	4.7	23.6	3.00	4295	676.0	53.3 ± 0.8	< 0.5 ± 0.5	110 ± 66
M-40	01/05/99	7.0	24.0	0.63	651	19.8	0.3 ± 0.1	< 0.5 ± 0.5	5 ± 3
M-73	01/05/99	6.5	24.2	0.47	9780	1123.0	50.5 ± 0.8	< 0.5 ± 0.5	120 ± 63
M-76	01/08/99	6.9	24.1	0.56	2890	150.0	2.0 ± 0.2	< 0.5 ± 0.5	5 ± 28
M-80	01/05/99	7.2	24.6	0.37	5840	799.0	2.9 ± 0.2	< 0.5 ± 0.5	67 ± 44
M-81	01/06/99	7.4	24.4	1.52	5440	566.0	4.4 ± 0.2	< 0.5 ± 0.5	34 ± 50
M-81 (dup)	01/06/99	7.4	24.4	1.04	5500	579.0	3.2 ± 0.2	< 0.5 ± 0.5	32 ± 52
M-86	12/23/98	5.2	25.6	10.40	622	58.7	1.8 ± 0.2	< 0.5 ± 0.5	5 ± 3
M-87	01/05/99	7.5	25.2	0.24	578	13.9	0.3 ± 0.1	< 0.5 ± 0.5	3 ± 3
M-91	01/06/99	6.0	24.8	4.10	229	21.5	1.1 ± 0.1	< 0.5 ± 0.5	< 1 ± 2
M-94	01/08/99	6.2	23.8	4.60	937	74.3	2.1 ± 0.2	< 0.5 ± 0.5	11 ± 4
M-95	01/08/99	7.0	24.3	0.37	5550	588.0	4.3 ± 0.2	< 0.5 ± 0.5	75 ± 57

Note: The shaded values indicate that the extraction and discharge standards were exceeded.

Table 4-12

Comparison of Sodium Concentration

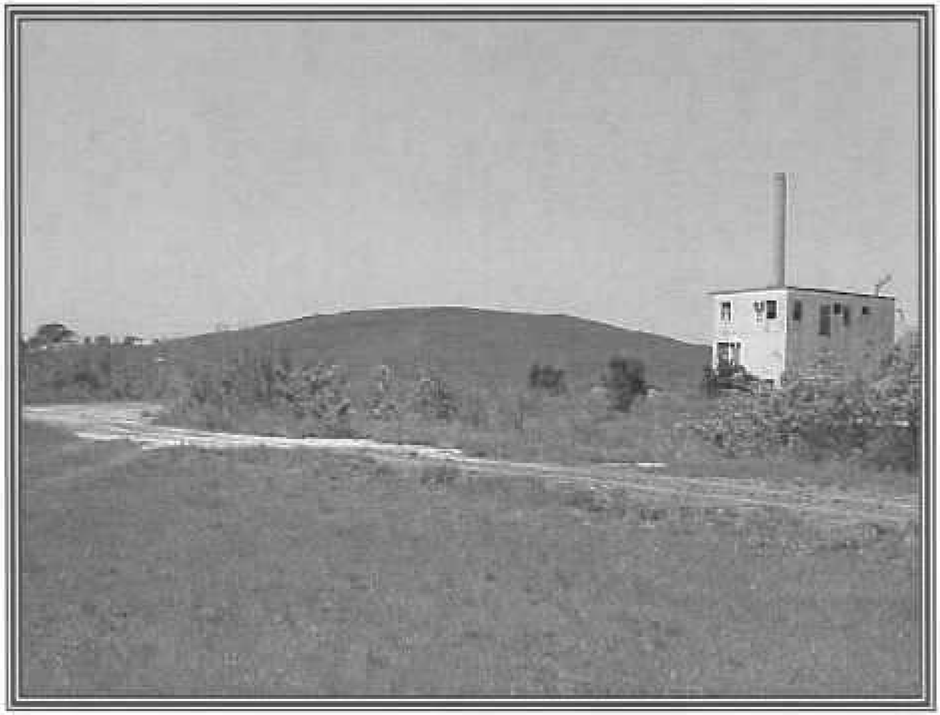
Well	Jul 1995	Nov 1997/Dec 1997	Dec 1998/Jan 1999
• **Shallow Aquifer Wells**			
M-19	434	558	450
M-25	391	503	390
M-50	563	309	379
M-52	210	262	184
M-65	24	26	24
M-67	10	9	14
M-68	6	8	6
M-90	24	21	23
M-96	155	49	32
• **Deep Aquifer Wells**			
M-22	860	837	676
M-40	14	19	20
M-73	1510	1340	1123
M-74	11	13	-
M-76	15	100	150
M-80	1170	1170	779
M-81	109	442	566
M-86	90	74	59
M-87	12	14	14
M-91	17	18	22
M-94	13	46	74
M-95	301	797	588

Table 4-13

Results of Analyses of Soil Samples from Spray Field

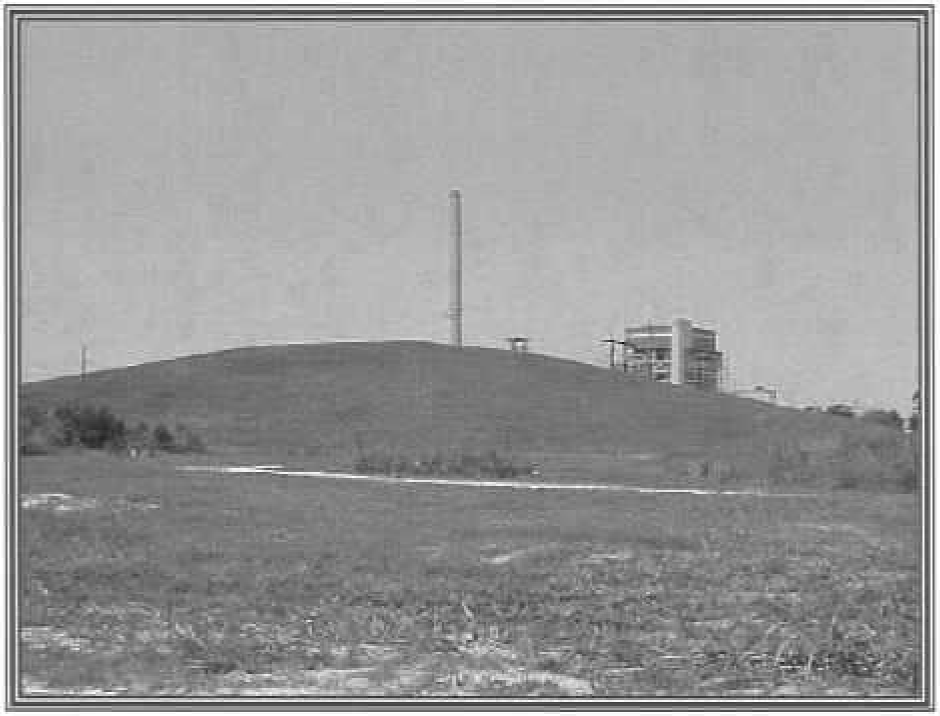
Sample Designation	Background Condition in Aug 1996			After One Year of Operation in Jun 1998			After Two Years of Operation in Aug 1999		
	Radium 226 (pCi/gm)	Radium 228 (pCi/gm)	Sodium (mg/kg)	Radium 226 (pCi/gm)	Radium 228 (pCi/gm)	Sodium (mg/kg)	Radium 226 (pCi/gm)	Radium 228 (pCi/gm)	Sodium (mg/kg)
A1	0.3±0.1	<0.5±0.5	118.0	0.5±0.1	<0.5±0.5	59.3	1.4±0.2	<0.5±0.5	127
A2	<0.1±0.1	<0.5±0.5	19.5	<0.1±0.1	<0.5±0.5	644 (?)	1.6±0.2	<0.5±0.5	104
A3	0.5±0.1	<0.5±0.5	15.2	0.1±0.1	<0.5±0.5	39.4	<0.1±0.1	<0.5±0.5	7.1
B1	0.1±0.1	<0.5±0.5	17.9	0.3±0.1	<0.5±0.5	88.1	0.4±0.1	<0.5±0.5	63.7
B2	0.1±0.1	<0.5±0.5	22.1	0.1±0.1	<0.5±0.5	59.1	0.1±0.1	<0.5±0.5	18.3
C1	0.1±0.1	<0.5±0.5	45.0	<0.1±0.1	<0.5±0.5	20.0	0.6±0.1	<0.5±0.5	6.2
C2	0.1±0.1	<0.5±0.5	20.5	0.3±0.1	<0.5±0.5	38.6	0.1±0.1	1.3±0.5	10.4
C3	0.1±0.1	<0.5±0.5	24.4	0.1±0.1	<0.5±0.5	36.6	0.3±0.1	1.2±0.5	33.0
C4	<0.1±0.1	<0.5±0.5	51.7	0.7±0.1	<0.5±0.5	57.3	0.7±0.1	1.7±0.5	49.1
C5	0.1±0.1	<0.5±0.5	9.9	0.1±0.1	<0.5±0.5	30.8	<0.1±0.1	<0.5±0.5	32.1

PHOTOGRAPHS



Photograph #1 **27 April 2000**
Location: Florida Steel Corporation, Martin County Site, Indiantown, Florida.
Description: Indiantown Mill Vault

Photograph #2 **27 April 2000**
Location: Florida Steel Corporation, Martin County Site, Indiantown, Florida.
Description: Treatment Facility and Well Manifolds with 300,000-Gallon Tank in the Background

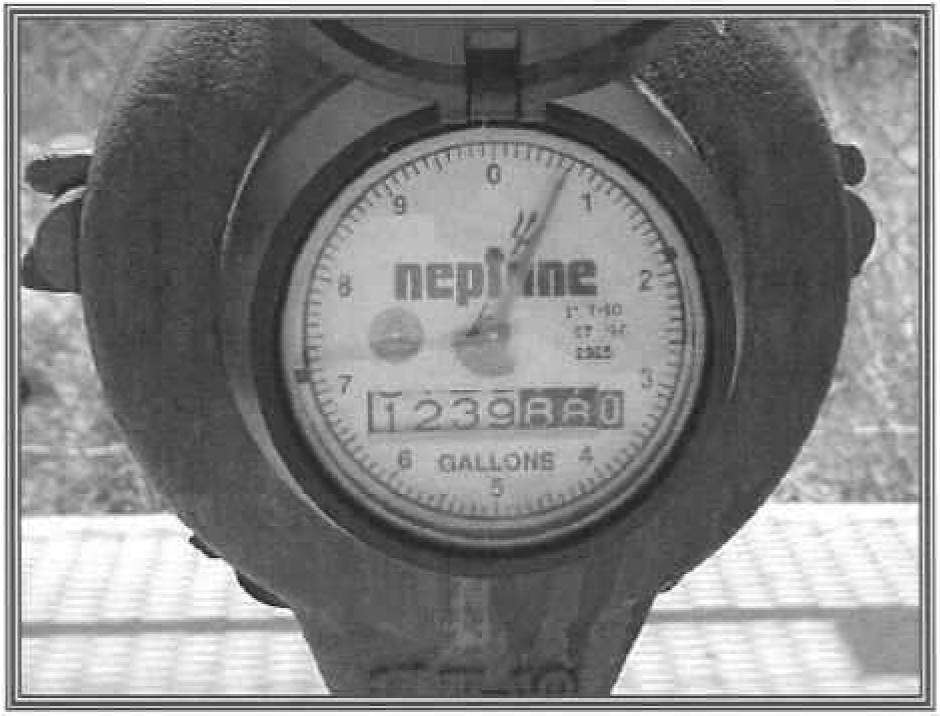


Photograph #3 **27 April 2000**
Location: Florida Steel Corporation, Martin County Site, Indiantown, Florida.
Description: Indiantown Mill Vault

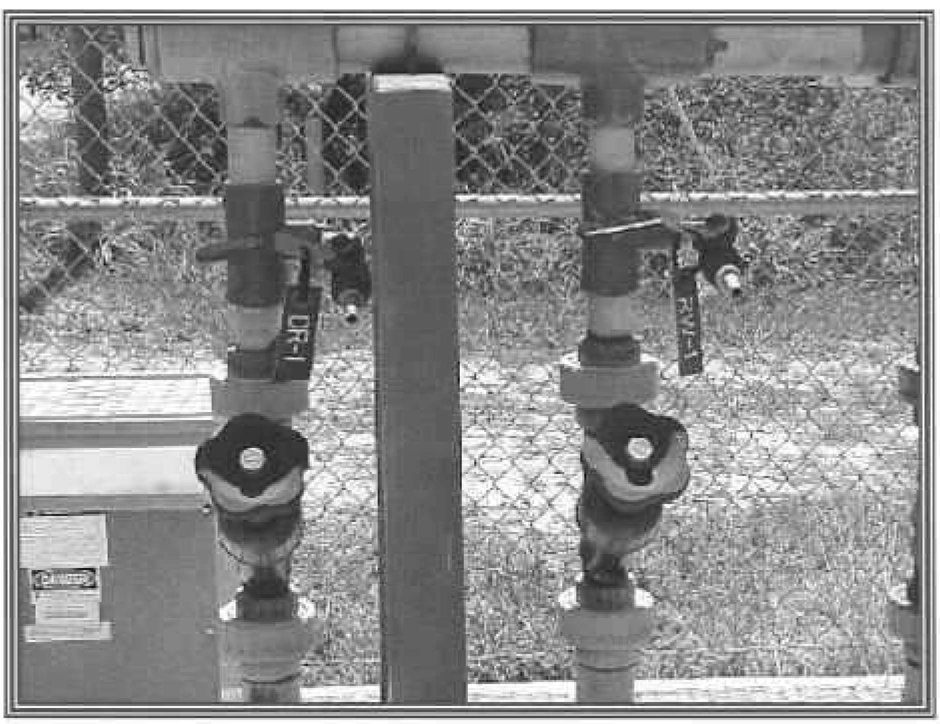
Photograph #4 **27 April 2000**
Location: Florida Steel Corporation, Martin County Site, Indiantown, Florida.
Description: Flow and Conductivity Meters Panel

Photograph #5 **27 April 2000**
Location: Florida Steel Corporation, Martin County Site, Indiantown, Florida.
Description: Iron Filtration Units

Photograph #6 **27 April 2000**
Location: Florida Steel Corporation, Martin County Site, Indiantown, Florida.
Description: Aeration Tank

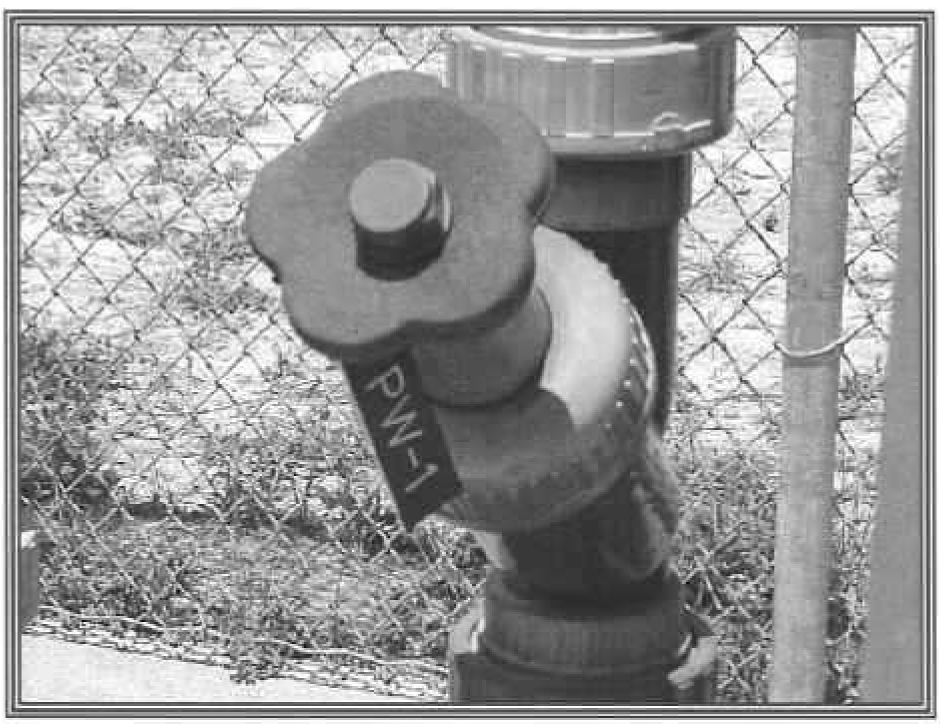


Photograph #7 **27 April 2000**
Location: Florida Steel Corporation, Martin County Site, Indiantown, Florida.
Description: Flow Meter



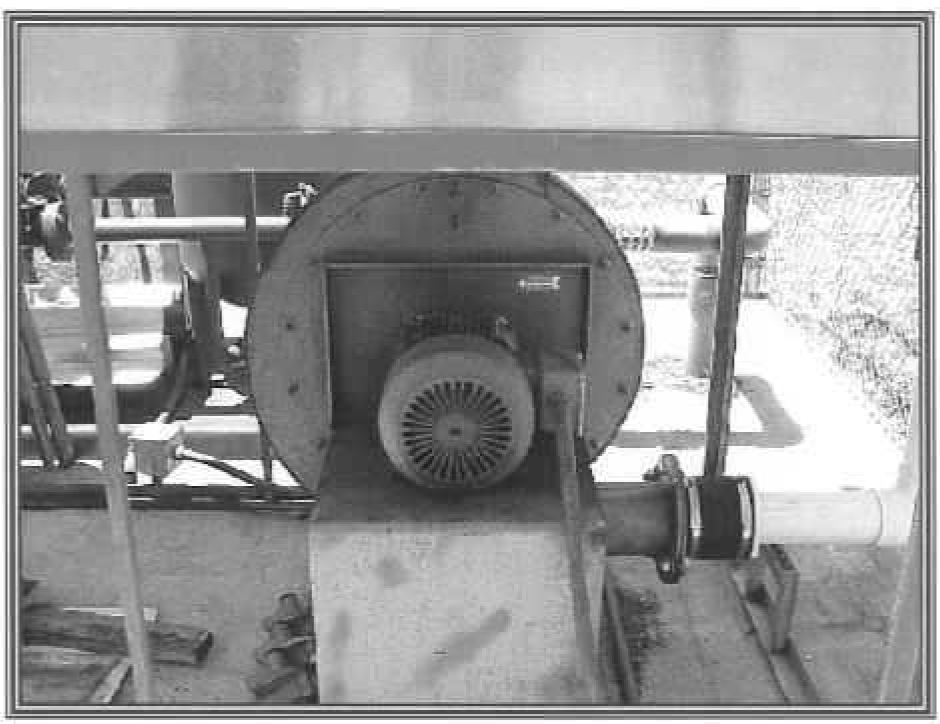
Photograph #8 **27 April 2000**
Location: Florida Steel Corporation, Martin County Site, Indiantown, Florida.
Description: Recovery Well Manifold

Photograph #9 **27 April 2000**
Location: Florida Steel Corporation, Martin County Site, Indiantown, Florida.
Description: Recovery Well Manifold

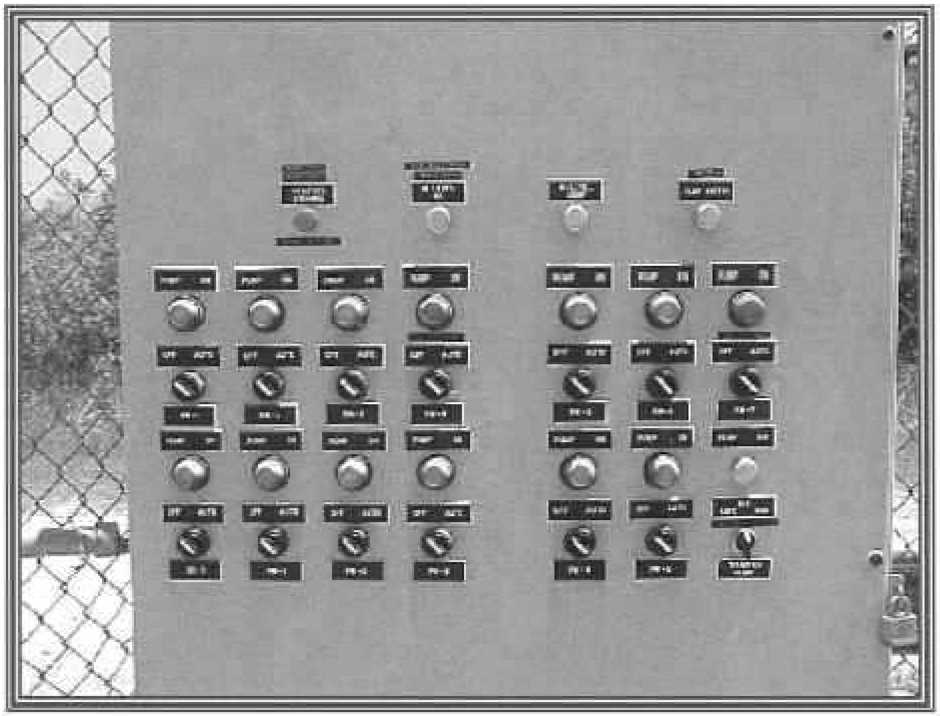


Photograph #10 **27 April 2000**
Location: Florida Steel Corporation, Martin County Site, Indiantown, Florida.
Description: Production Well Manifold

Photograph #11 **27 April 2000**
Location: Florida Steel Corporation, Martin County Site, Indiantown, Florida.
Description: Production Well Manifold



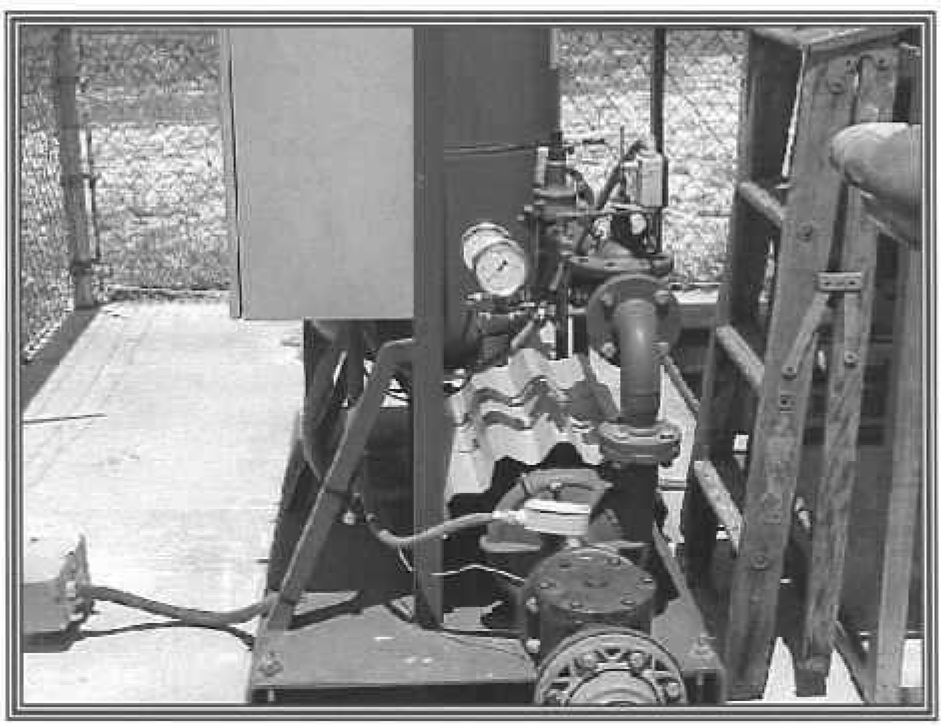
Photograph #12 **27 April 2000**
Location: Florida Steel Corporation, Martin County Site, Indiantown, Florida.
Description: Blower for Aeration Tank



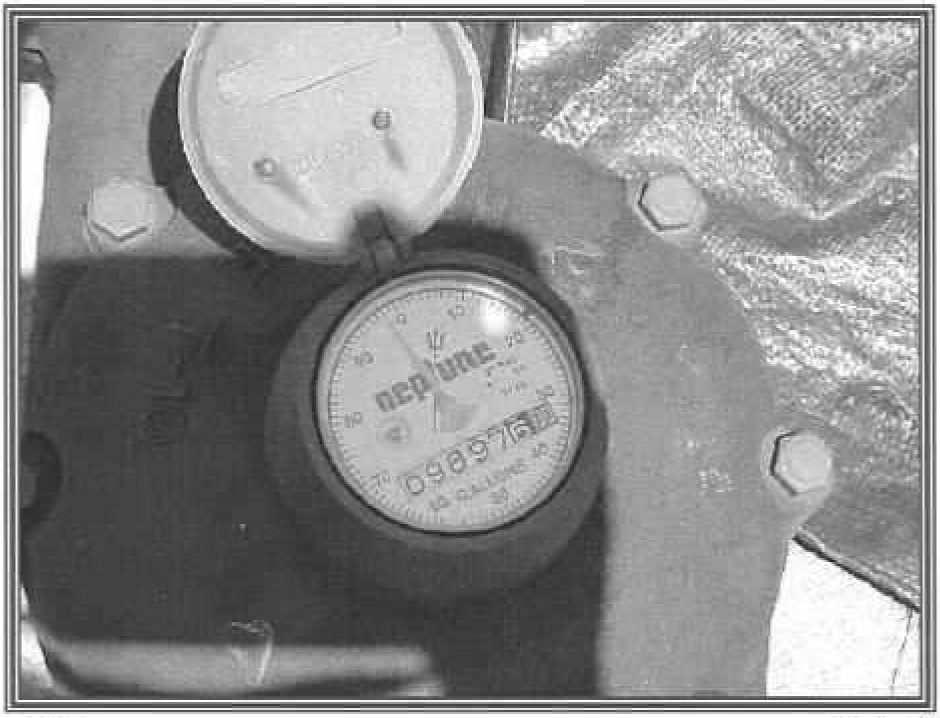
Photograph #13 **27 April 2000**
Location: Florida Steel Corporation, Martin County Site, Indiantown, Florida.
Description: Control Panel for Groundwater Remediation System

Photograph #14 **27 April 2000**
Location: Florida Steel Corporation, Martin County Site, Indiantown, Florida.
Description: Injection Well Manifold

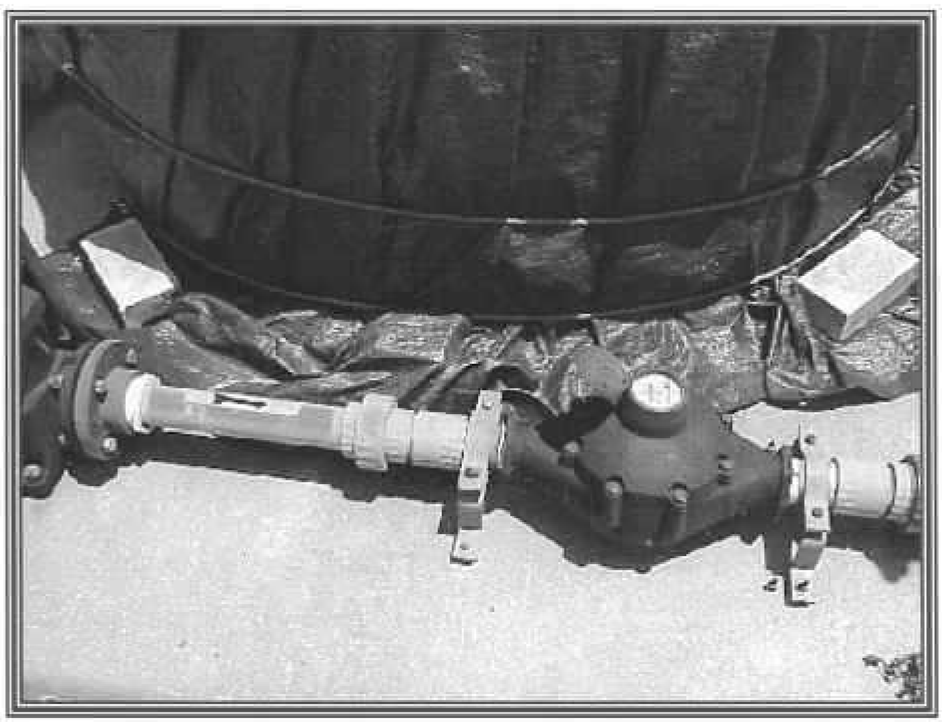
Photograph #15 ***27 April 2000***
Location: Florida Steel Corporation, Martin County Site, Indiantown, Florida.
Description: Injection Well Manifold



Photograph #16 ***27 April 2000***
Location: Florida Steel Corporation, Martin County Site, Indiantown, Florida.
Description: Irrigation Pump Station

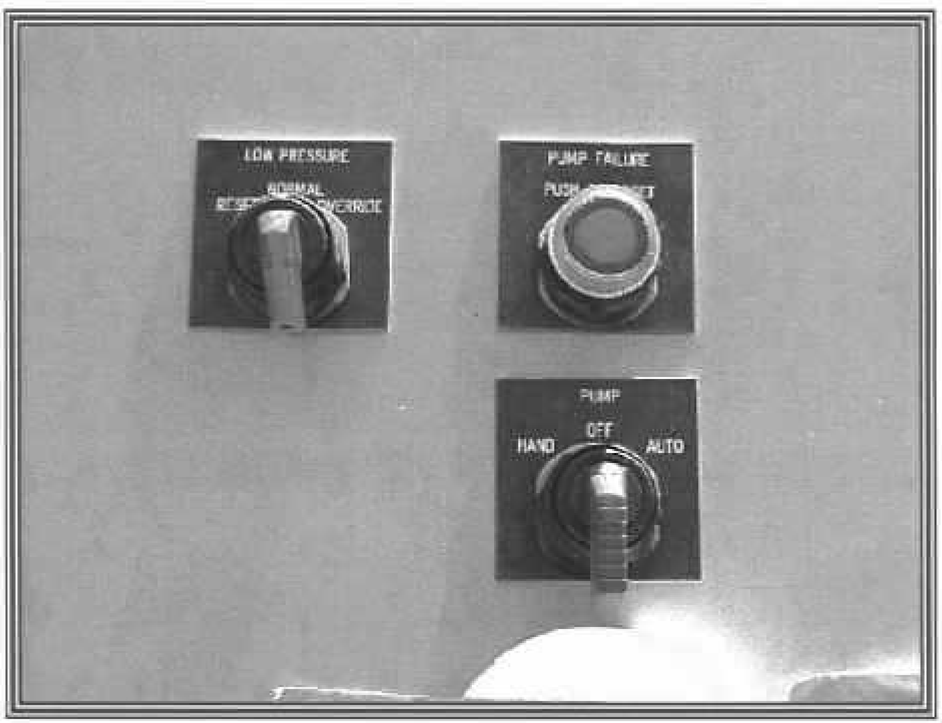


Photograph #17 **27 April 2000**
Location: Florida Steel Corporation, Martin County Site, Indiantown, Florida.
Description: Flow Meter

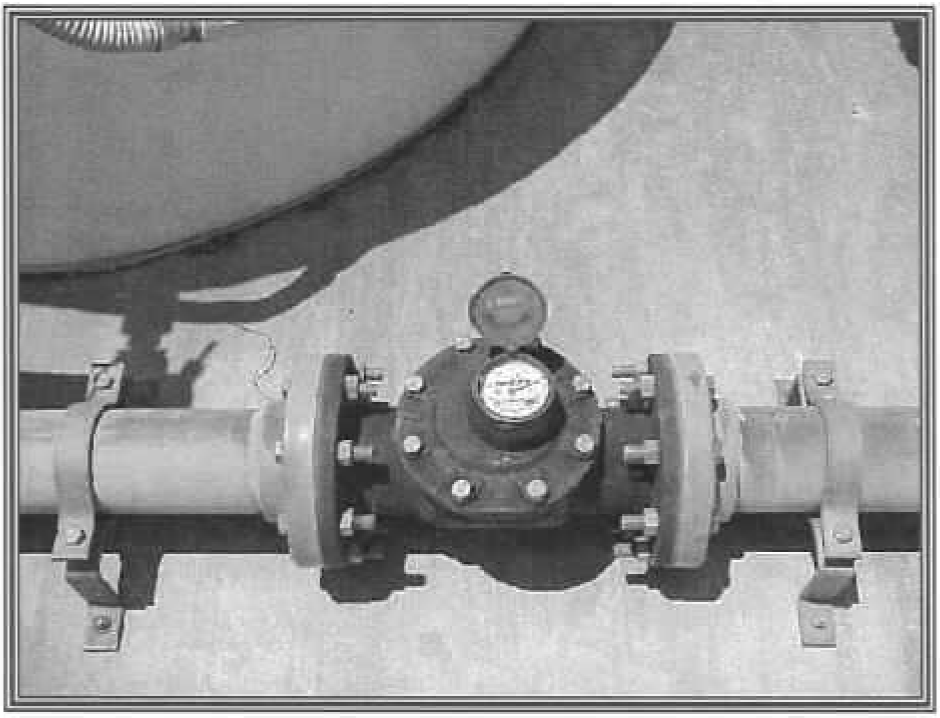


Photograph #18 **27 April 2000**
Location: Florida Steel Corporation, Martin County Site, Indiantown, Florida.
Description: In-line Flow Meter

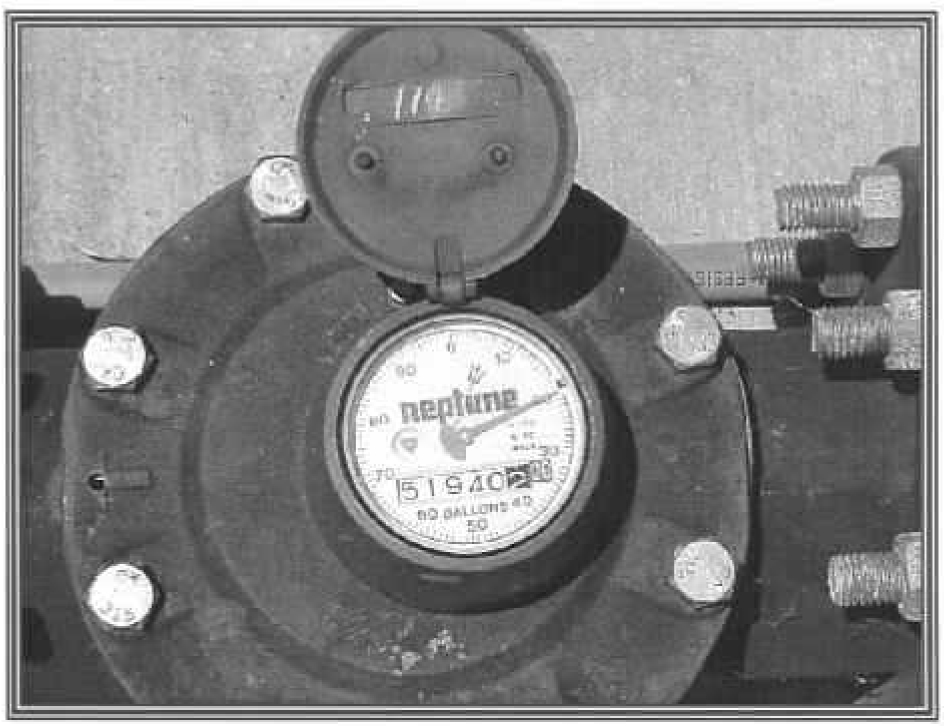
Photograph #19 **27 April 2000**
Location: Florida Steel Corporation, Martin County Site, Indiantown, Florida.
Description: Irrigation Pump



Photograph #20 **27 April 2000**
Location: Florida Steel Corporation, Martin County Site, Indiantown, Florida.
Description: Irrigation Pump Control

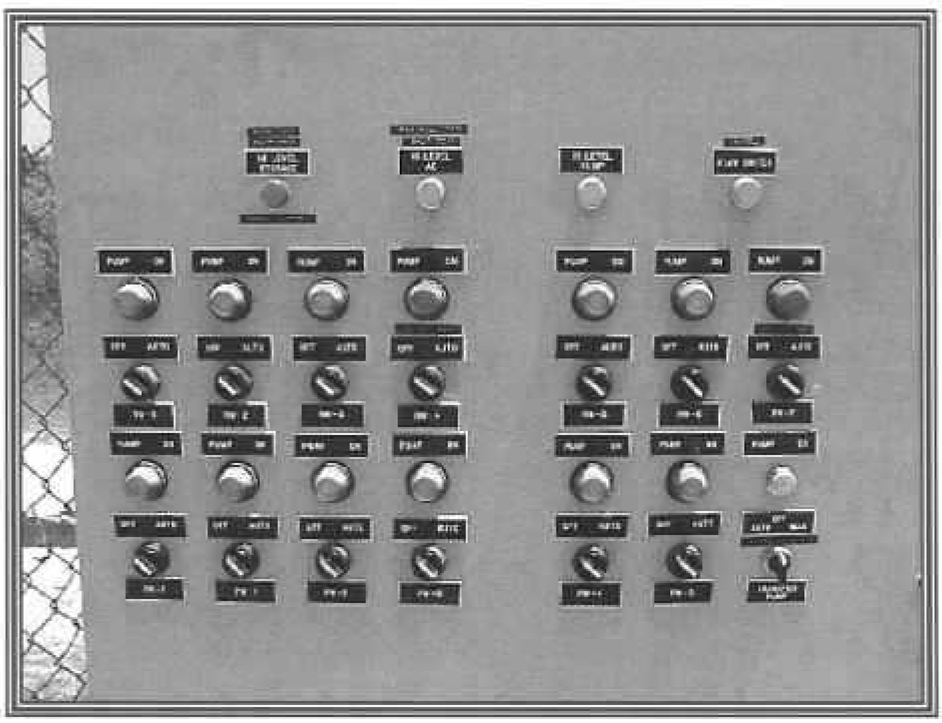


Photograph #21 **27 April 2000**
Location: Florida Steel Corporation, Martin County Site, Indiantown, Florida.
Description: Flow Meter

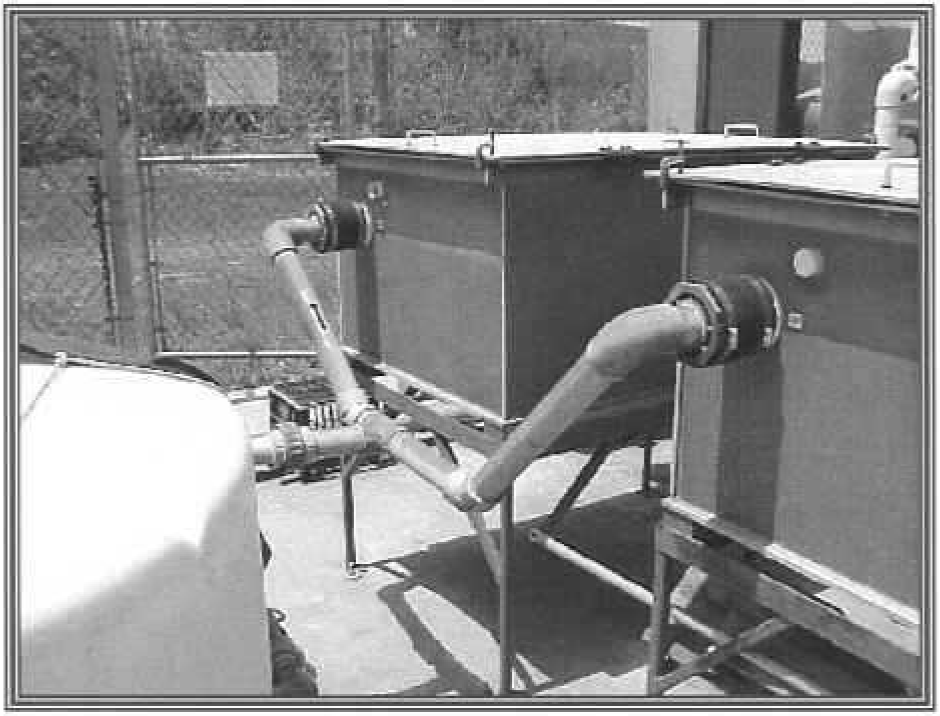


Photograph #22 **27 April 2000**
Location: Florida Steel Corporation, Martin County Site, Indiantown, Florida.
Description: Flow Meter

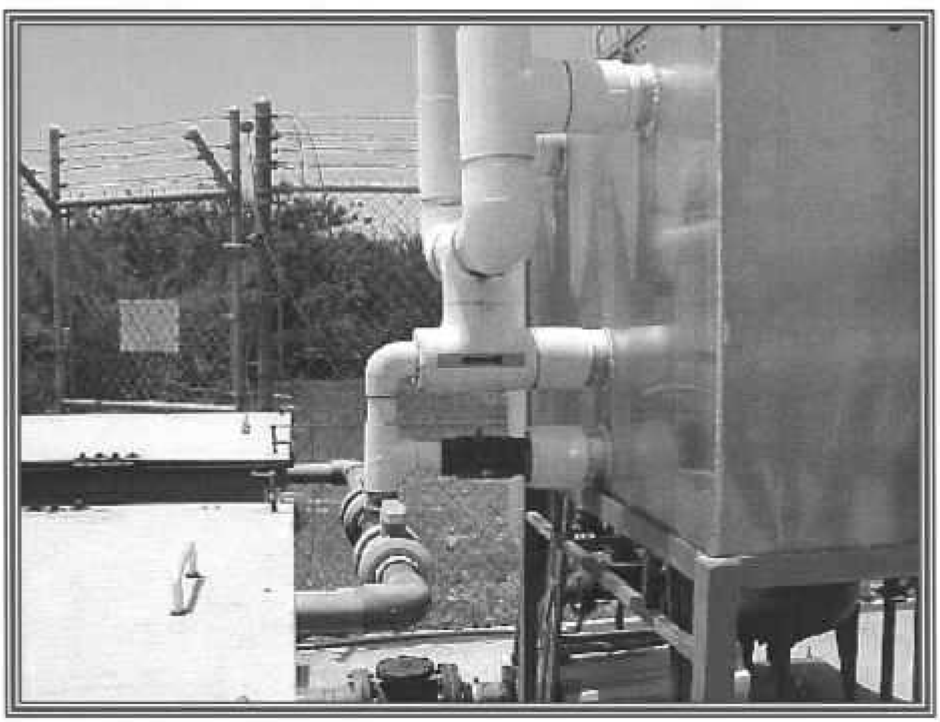
Photograph #23 **27 April 2000**
Location: Florida Steel Corporation, Martin County Site, Indiantown, Florida.
Description: Iron Filtration Units



Photograph #24 **27 April 2000**
Location: Florida Steel Corporation, Martin County Site, Indiantown, Florida.
Description: Control Panel for Groundwater Remediation System

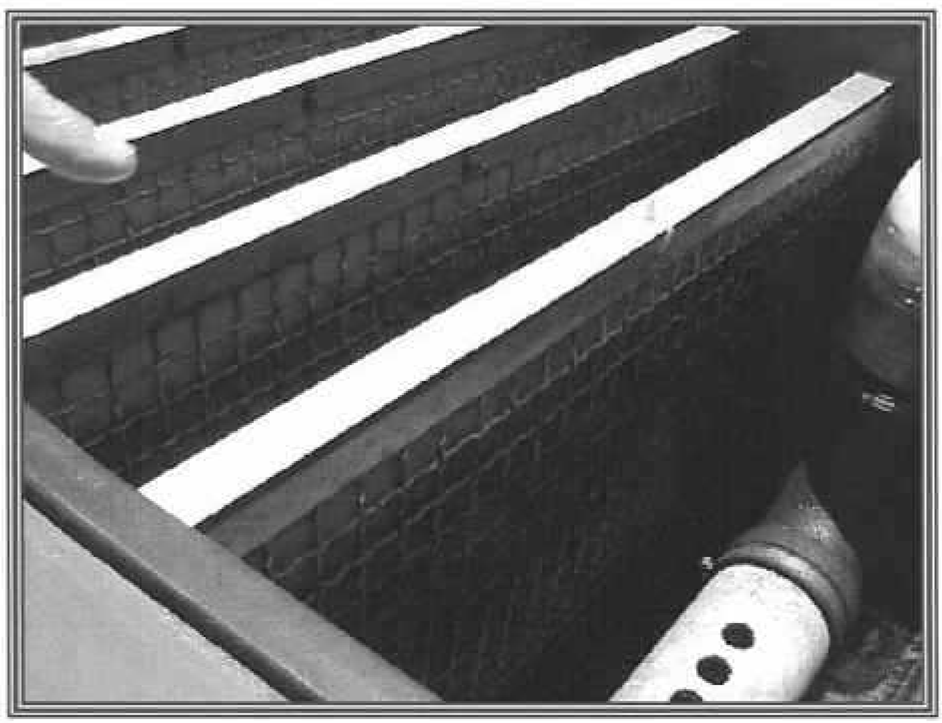


Photograph #25 **27 April 2000**
Location: Florida Steel Corporation, Martin County Site, Indiantown, Florida.
Description: Iron Filtration Unit Manifold and 500-gallon Storage Tank

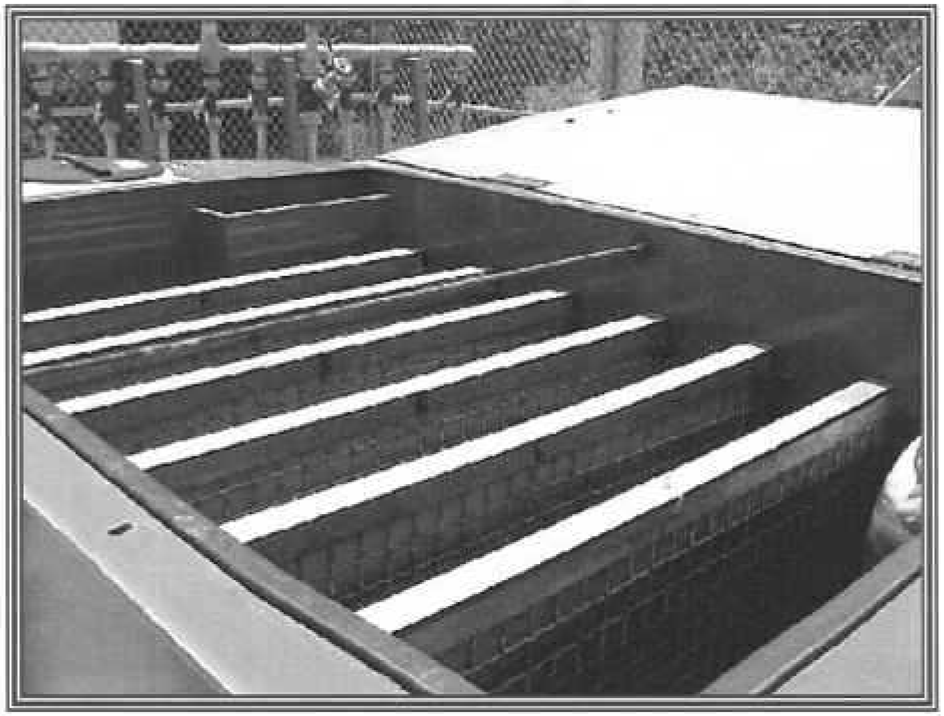


Photograph #26 **27 April 2000**
Location: Florida Steel Corporation, Martin County Site, Indiantown, Florida.
Description: Aeration Tank Manifold and Iron Filtration Units

Photograph #27 **27 April 2000**
Location: Florida Steel Corporation, Martin County Site, Indiantown, Florida.
Description: Recovery Well Manifold



Photograph #28 **27 April 2000**
Location: Florida Steel Corporation, Martin County Site, Indiantown, Florida.
Description: Iron Filters



Photograph #29 **27 April 2000**
Location: Florida Steel Corporation, Martin County Site, Indiantown, Florida.
Description: Iron Filters

Photograph #30 **27 April 2000**
Location: Florida Steel Corporation, Martin County Site, Indiantown, Florida.
Description: Leachate Collection/Leak Detection Pipes and Cleanouts

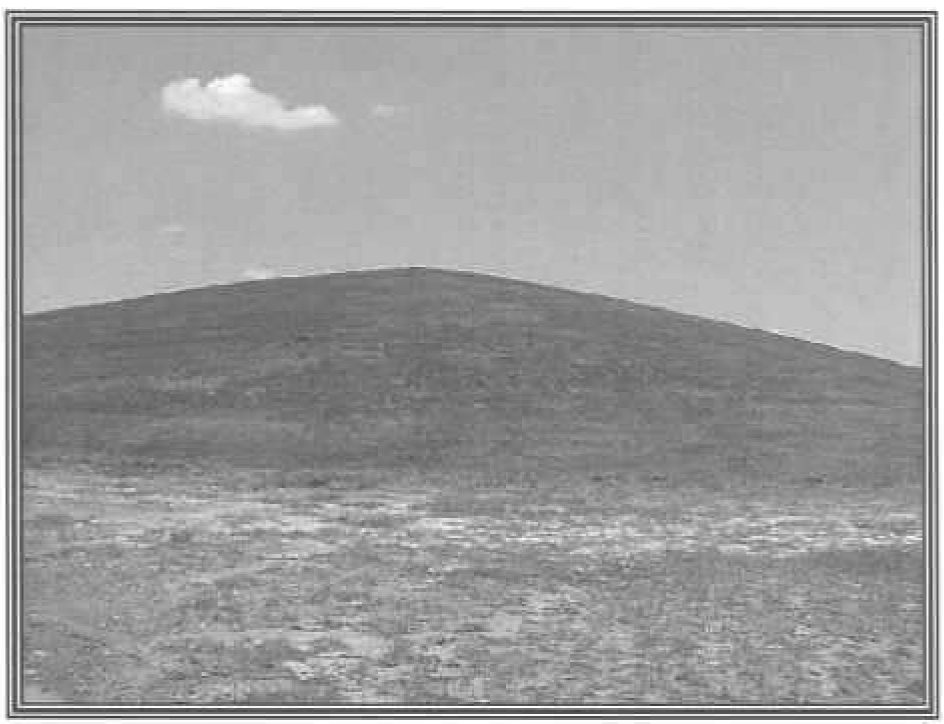
Photograph #31 **27 April 2000**
Location: Florida Steel Corporation, Martin County Site, Indiantown, Florida.
Description: Stormwater Pond

Photograph #32 **27 April 2000**
Location: Florida Steel Corporation, Martin County Site, Indiantown, Florida.
Description: Remediation Southwest Wetland

Photograph #33 **27 April 2000**
Location: Florida Steel Corporation, Martin County Site, Indiantown, Florida.
Description: Culvert that Conveys Water off AmeriSteel Property into Southwest Wetland

Photograph #34 **27 April 2000**
Location: Florida Steel Corporation, Martin County Site, Indiantown, Florida.
Description: Southwest Wetland

Photograph #35 **27 April 2000**
Location: Florida Steel Corporation, Martin County Site, Indiantown, Florida.
Description: Indiantown Mill Vault



Photograph #36 **27 April 2000**
Location: Florida Steel Corporation, Martin County Site, Indiantown, Florida.
Description: Indiantown Mill Vault

Photograph #37 **27 April 2000**
Location: Florida Steel Corporation, Martin County Site, Indiantown, Florida.
Description: Remediated Southwest Wetland

ATTACHMENTS

Attachment A

Documents Reviewed

Reports and Memorandums

- "Superfund Remedial Investigation Fact Sheet, Florida Steel Corporation Superfund Site, Indiantown, Martin County, Florida", United States Environmental Protection Agency, December 1990.

- "Superfund Proposed Plan Fact Sheet, Florida Steel Corporation Superfund Site, Indiantown, Martin County, Florida", United States Environmental Protection Agency, April 1992.

- "Remedial Design Work Plan, Operable Unit 1, Florida Steel Corporation, Indiantown Mill, Martin County, Florida", Revision No. 1, Ardaman & Associates, Inc., May 10, 1993.

- "Feasibility Study Report, Operable Unit 2, Florida Steel Corporation, Indiantown Mill, Martin County, Florida", Revision No. 1, Ardaman & Associates, Inc., November 23, 1993.

- "Superfund Proposed Plan, Region IV, Florida Steel Superfund Site, Indiantown, Martin County, Florida", United States Environmental Protection Agency, February 1994.

- "Remedial Design Report, Operable Unit 1, Florida Steel Corporation, Indiantown Mill, Martin County, Florida", Volume I, Project History and Remedial Design, Revision No. 0, Ardaman & Associates, Inc., September 9, 1994.

- "Remedial Design Report, Operable Unit 1, Florida Steel Corporation, Indiantown Mill, Martin County, Florida", Volume II, Treatability Study, Revision No. 0, Ardaman & Associates, Inc., September 9, 1994.

- "Remedial Design Report, Operable Unit 1, Florida Steel Corporation, Indiantown Mill, Martin County, Florida", Volume III, Technical Specifications, Revision No. 0, Ardaman & Associates, Inc., September 9, 1994.

- "Remedial Design Work Plan, Operable Unit 2, Florida Steel Corporation, Indiantown Mill, Martin County, Florida", Revision No. 1, Ardaman & Associates, Inc., January 16, 1995.

- "Photograph Log, Florida Steel NPL Site, Indiantown, Martin County", United States Environmental Protection Agency, EPA Personnel: Randy Bryant, March 7-8, 1995.

- "Remedial Design and Remedial Action Work Plan, Remediation of Southwest Wetland, Florida Steel Corporation, Indiantown Mill, Martin County, Florida", Revision No. 1, May 10, 1995.

- "On-Site Monitoring: September 8-10, 1995 and October 4, 1995, Florida Steel Site, Indiantown, Florida", Roy F. Weston, Inc., October 12, 1995.

- "Revised Top Cover Design for On-Site Containment System Remediation, Operable Unit 1, Florida Steel Corporation, Indiantown Mill, Martin County, Florida", Ardaman & Associates, Inc., January 11, 1996.

- "Remedial Action Work Plan, Remediation of Groundwater Plume, Operable Unit 2, Florida Steel Corporation, Indiantown Mill, Martin County, Florida", Revision No. 1, Ardaman & Associates, Inc., February 15, 1996.

- "Performance Standards Verification Plan, Remediation of Groundwater Plume, Operable Unit 2, Florida Steel Corporation, Indiantown Mill, Martin County, Florida", Revision No. 1, Ardaman & Associates, Inc., February 15, 1996.

- "Remedial Design Report, Remediation of Groundwater Plume, Operable Unit 2, Florida Steel Corporation, Indiantown Mill, Martin County, Florida", Revision No. 1, Ardaman & Associates, Inc., February 15, 1996.

- "Field Oversight Summary Report for March 21-22, 1996, Florida Steel Indiantown Mill Site, Indiantown, Florida", Roy F. Weston, Inc., March 29, 1996.

- "Transmittal of Final Proiect Report, Operable Unit 1, Florida Steel Indiantown Mill Site, Martin County, Florida", Roy F. Weston, Inc., July 19, 1996.

- "Operation & Maintenance Plan and Performance Standards Verification Plan, Operable Unit 1, AmeriSteel Indiantown Mill, Martin County, Florida", Revision No. 0, Ardaman & Associates, Inc., August 26, 1996.

- "Remedial Action Report, Operable Unit 1, AmeriSteel Indiantown Mill, Martin County, Florida", Volume I, Revision No. 0, Ardaman & Associates, Inc., September 23, 1996.

- "Remedial Action Report for Southwest Wetland, AmeriSteel Indiantown Mill, Martin County, Florida", Revision No. 1, Ardaman & Associates, Inc., December 13, 1996.

- "Background Analyses of Spray Field Samples, AmeriSteel Indiantown Mill, Martin County, Florida", Ardaman & Associates, Inc., February 3, 1997.

- "Startup and Testing of Groundwater Remediation and Spray Irrigation System Remedial Action Program, Operable Unit 2, AmeriSteel Indiantown Mill, Martin County, Florida", Ardaman & Associates, Inc., March 13, 1997.

- "Field Oversight Summary Report, Operable Unit 2, Florida Steel, Martin County, Florida", Roy F. Weston, Inc., May 19, 1997.

- "Superfund Preliminary Close Out Report, Florida Steel NPL Site", Martin County, Florida, September 7, 1997.

- "Sampling and Testing of Groundwater Remediation and Spray Irrigation System for the Second and Third Months of Operation, Remedial Action Program, Operable Unit 2, AmeriSteel Indiantown Mill, Martin County, Florida", Ardaman & Associates, Inc., October 15, 1997.

- "Operation and Maintenance Manual Groundwater Remediation and Spray Irrigation System, Operable Unit 2, AmeriSteel Indiantown Mill, Martin County, Florida", Ardaman & Associates, Inc., November 5, 1997.

- "Construction Report, Remediation of Groundwater Plume, Operable Unit 2, Florida Steel Corporation, Indiantown Mill, Martin County, Florida", Revision No. 0, Ardaman & Associates, Inc., December 2, 1997.

- "1997 Post Remediation Annual Report, Operable Unit 1, AmeriSteel Indiantown Mill, Martin County, Florida", Ardaman & Associates, Inc., March 9, 1998.

- "Monitoring of Southwest Wetland, AmeriSteel Indiantown Mill, Martin County, Florida", Ardaman & Associates, Inc., September 8, 1998.

- "Annual Report, Groundwater Remediation Program, Operable Unit 2, AmeriSteel Indiantown Mill, Martin County, Florida", Ardaman & Associates, Inc., September 25, 1998.

- Indiantown Operable Unit 1 Progress Reports for August 1998-December 1999, AmeriSteel.

- "1998 Post Remediation Annual Report, Operable Unit 1, AmeriSteel Indiantown Mill, Martin County, Florida", Ardaman & Associates, Inc., August 30, 1999.

- United States Environmental Protection Agency, Record of Decision (ROD) The Declaration for Operable Unit One, Florida Steel Corporation, June 30, 1992

- United States Environmental Protection Agency, Record of Decision (ROD) The Declaration for Operable Unit Two, Florida Steel Corporation, (Need Date)

Attachment B

Site Inspection Checklist

Please note that "O&M" is referred to throughout this checklist. At sites where Long-Term Response Actions are in progress, O&M activities may be referred to as "system operations" since these sites are not considered to be in the O&M phase while being remediated under the Superfund program.

Five-Year Review Site Inspection Checklist (Template)

(Working document for site inspection. Information may be completed by hand and attached to the five-year review report as supporting documentation of site status. "N/A" refers to "not applicable.")

I. SITE INFORMATION	
Site name: AMERI STEEL INDIANTOWN MILL FKA FLORIDA STEEL CORP.	**Date of Inspection:** 4/27/00
Location and Region:	**EPA ID:** FLD050432251
Agency, office, or company leading the five-year review: USACE, JACKSONVILLE	**Weather/temperature:** WARM, CLEAR, SUNNY, 80°F

Remedy Includes: (Check all that apply)

- G Landfill cover/containment ✓
- G Access controls ✓
- G Institutional controls ✓
- G Groundwater pump and treatment ✓
- G Surface water collection and treatment
- G Other____

Attachments: G Inspection team roster attached G Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** Donnie Douglas (Name) O&M Program Supervisor (Title) 4/27/00 (Date)
   Interviewed G at site G at office G by phone Phone no. 561.597.2134
   Problems, suggestions; G Report attached ______________________________

2. **O&M staff** Same as #1 (Name) __________ (Title) __________ (Date)
   Interviewed G at site G at office G by phone Phone no. __________
   Problems, suggestions; G Report attached ______________________________

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency ______________________
Contact ______________________ ______________ ________ ________
Name Title Date Phone no.
Problems; suggestions; G Report attached ______________________

Agency ______________________
Contact ______________________ ______________ ________ ________
Name Title Date Phone no.
Problems; suggestions; G Report attached ______________________

Agency ______________________
Contact ______________________ ______________ ________ ________
Name Title Date Phone no.
Problems; suggestions; G Report attached ______________________

Agency ______________________
Contact ______________________ ______________ ________ ________
Name Title Date Phone no.
Problems; suggestions; G Report attached ______________________

4. **Other interviews** (optional) G Report attached.

III. ONSITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)				
1.	**O&M Documents**			
	G O&M manual	G Readily available	G Up to date	G N/A
	G As-built drawings	G Readily available	G Up to date	G N/A
	G Maintenance logs	G Readily available	G Up to date	G N/A
	Remarks All pertinent O&M documents were ON-SITE AND AVAILABLE			
2.	**Site-Specific Health and Safety Plan**	G Readily available	G Up to date	G N/A
	G Contingency plan/emergency response plan	G Readily available	G Up to date	G N/A
	Remarks - SAME			
3.	**O&M and OSHA Training Records**	G Readily available	G Up to date	G N/A
	Remarks - SAME			
4.	**Permits and Service Agreements**			
	G Air discharge permit	G Readily available	G Up to date	G N/A
	G Effluent discharge	G Readily available	G Up to date	G N/A
	G Waste disposal, POTW	G Readily available	G Up to date	G N/A
	G Other permits______	G Readily available	G Up to date	G N/A
	Remarks N/A			
5.	**Gas Generation Records**	G Readily available	G Up to date	G N/A
	Remarks N/A			
6.	**Settlement Monument Records**	G Readily available	G Up to date	G N/A
	Remarks N/A			
7.	**Groundwater Monitoring Records**	G Readily available	G Up to date	G N/A
	Remarks			
8.	**Leachate Extraction Records**	G Readily available	G Up to date	G N/A
	Remarks			
9.	**Discharge Compliance Records**			
	G Air	G Readily available	G Up to date	G N/A
	G Water (effluent)	G Readily available	G Up to date	G N/A
	Remarks			
10.	**Daily Access/Security Logs**	G Readily available	G Up to date	G N/A
	Remarks			

IV. O&M COSTS

1. **O&M Organization**
   G State in-house G Contractor for State
   G PRP in-house G Contractor for PRP
   G Other____________________

2. **O&M Cost Records** DATA UNAVAILABLE
   G Readily available G Up to date
   G Funding mechanism/agreement in place
   Original O&M cost estimate__________ G Breakdown attached

   Total annual cost by year for review period if available

   From______ To______ ________ G Breakdown attached
   Date Date Total cost
   From______ To______ ________ G Breakdown attached
   Date Date Total cost
   From______ To______ ________ G Breakdown attached
   Date Date Total cost
   From______ To______ ________ G Breakdown attached
   Date Date Total cost
   From______ To______ ________ G Breakdown attached
   Date Date Total cost

3. **Unanticipated or Unusually High O&M Costs During Review Period**
   Describe costs and reasons: DATA UNAVAILABLE

V. ACCESS AND INSTITUTIONAL CONTROLS G Applicable G N/A

A. Fencing

1. **Fencing damaged** G Location shown on site map G Gates secured G N/A
   Remarks GATES NOT SECURE

B. Other Access Restrictions

1. **Signs and other security measures** G Location shown on site map G N/A
   Remarks NEED SIGNAGE

C. Institutional Controls

1. **Implementation and enforcement**
   Site conditions imply ICs not properly implemented G Yes G No G N/A
   Site conditions imply ICs not being fully enforced G Yes G No G N/A

   Type of monitoring (e.g., self-reporting, drive by) ____
   Frequency ____
   Responsible party/agency ____
   Contact Donnie Douglas | O&M Program Supv | 4/27/00 | 561.597 2134
   Name | Title | Date | Phone no.

   Reporting is up-to-date G Yes G No G N/A
   Reports are verified by the lead agency G Yes G No G N/A

   Specific requirements in deed or decision documents have been met G Yes G No G N/A
   Violations have been reported G Yes G No G N/A
   Other problems or suggestions: G Report attached

2. **Adequacy** G ICs are adequate G ICs are inadequate G N/A
   Remarks ____

D. General

1. **Vandalism/trespassing** G Location shown on site map G No vandalism evident
   Remarks ____

2. **Land use changes onsite** G N/A
   Remarks ____

3. **Land use changes offsite** G N/A
   Remarks ____

VI. GENERAL SITE CONDITIONS

A. Roads G Applicable G N/A

1. **Roads damaged** G Location shown on site map G Roads adequate G N/A
Remarks____
____

B. Other Site Conditions

Remarks____
____
____
____
____
____

VII. LANDFILL COVERS G Applicable G N/A

A. Landfill Surface

1. **Settlement** (Low spots) G Location shown on site map G Settlement not evident
Areal extent______________ Depth______________
Remarks____
____

2. **Cracks** G Location shown on site map G Cracking not evident
Lengths____________ Widths____________ Depths____________
Remarks____
____

3. **Erosion** G Location shown on site map G Erosion not evident
Areal extent______________ Depth______________
Remarks____
____

4. **Holes** G Location shown on site map G Holes not evident
Areal extent______________ Depth______________
Remarks____
____

5. **Vegetative Cover** G Grass G Cover properly established G No signs of stress
G Trees/Shrubs (indicate size and locations on a diagram)
Remarks____
____

6. **Alternative Cover (armored rock, concrete, etc.)** G N/A
Remarks____
____

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7. **Bulges** G Location shown on site map G Bulges not evident
Areal extent______ Height______
Remarks______

8. **Wet Areas/Water Damage** G Wet areas/water damage not evident
G Wet areas G Location shown on site map Areal extent______
G Ponding G Location shown on site map Areal extent______
G Seeps G Location shown on site map Areal extent______
G Soft subgrade G Location shown on site map Areal extent______
Remarks N/A______

9. **Slope Instability** G Slides G Location shown on site map G No evidence of slope instability
Areal extent______
Remarks______

B. Benches G Applicable G N/A
(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** G Location shown on site map G N/A or okay
Remarks______

2. **Bench Breached** G Location shown on site map G N/A or okay
Remarks______

3. **Bench Overtopped** G Location shown on site map G N/A or okay
Remarks______

C. Letdown Channels G Applicable G N/A
(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** G Location shown on site map G No evidence of settlement
Areal extent______ Depth______
Remarks______

2. **Material Degradation** G Location shown on site map G No evidence of degradation
Material type______ Areal extent______
Remarks______

3.	**Erosion** G Location shown on site map G No evidence of erosion Areal extent______________ Depth____________ Remarks____ ____	
4.	**Undercutting** G Location shown on site map G No evidence of undercutting Areal extent______________ Depth____________ Remarks____ ____	
5.	**Obstructions** Type____________________ G No obstructions G Location shown on site map Areal extent______________ Size____________ Remarks____ ____	
6.	**Excessive Vegetative Growth** Type____________________ G No evidence of excessive growth G Vegetation in channels does not obstruct flow G Location shown on site map Areal extent______________ Remarks____ ____	
D.	**Cover Penetrations** G Applicable G N/A	
1.	**Gas Vents** G Active G Passive G Properly secured/locked G Functioning G Routinely sampled G Good condition G Evidence of leakage at penetration G Needs O&M G N/A Remarks____ ____	
2.	**Gas Monitoring Probes** G Properly secured/locked G Functioning G Routinely sampled G Good condition G Evidence of leakage at penetration G Needs O&M G N/A Remarks____ ____	
3.	**Monitoring Wells** (within surface area of landfill) G Properly secured/locked G Functioning G Routinely sampled G Good condition G Evidence of leakage at penetration G Needs O&M G N/A Remarks____ ____	
4.	**Leachate Extraction Wells** G Properly secured/locked G Functioning G Routinely sampled G Good condition G Evidence of leakage at penetration G Needs O&M G N/A Remarks____ ____	

5.	**Settlement Monuments** Remarks______	G Located	G Routinely surveyed	G N/A
E. Gas Collection and Treatment		G Applicable	G N/A	
1.	**Gas Treatment Facilities** G Flaring G Thermal destruction G Collection for reuse G Good condition G Needs O&M Remarks______			
2.	**Gas Collection Wells, Manifolds and Piping** G Good condition G Needs O&M Remarks______ N/A			
3.	**Gas Monitoring Facilities** (e.g., gas monitoring of adjacent homes or buildings) G Good condition G Needs O&M G N/A Remarks______			
F. Cover Drainage Layer		G Applicable	G N/A	
1.	**Outlet Pipes Inspected** Remarks______	G Functioning	G N/A	
2.	**Outlet Rock Inspected** Remarks______	G Functioning	G N/A	
G. Detention/Sedimentation Ponds		G Applicable	G N/A	
1.	**Siltation** Areal extent______ Depth______ G Siltation not evident Remarks______			G N/A
2.	**Erosion** Areal extent______ Depth______ G Erosion not evident Remarks______			
3.	**Outlet Works** Remarks______	G Functioning	G N/A	
4.	**Dam** Remarks______	G Functioning	G N/A	

H. Retaining Walls	G Applicable	G N/A	
1.	**Deformations** Horizontal displacement__________ Rotational displacement__________ Remarks__________	G Location shown on site map Vertical displacement__________	G Deformation not evident
2.	**Degradation** Remarks______ N/A	G Location shown on site map	G Degradation not evident
I. Perimeter Ditches/Off-Site Discharge		G Applicable	G N/A
1.	**Siltation** Areal extent__________ Remarks__________	G Location shown on site map Depth__________	G Siltation not evident
2.	**Vegetative Growth** G Vegetation does not impede flow Areal extent__________ Remarks__________	G Location shown on site map Type__________	G N/A
3.	**Erosion** Areal extent__________ Remarks__________	G Location shown on site map Depth__________	G Erosion not evident
4.	**Discharge Structure** Remarks__________	G Functioning G N/A	
VIII. VERTICAL BARRIER WALLS		G Applicable	G N/A
1.	**Settlement** Areal extent__________ Remarks______ N/A	G Location shown on site map Depth__________	G Settlement not evident
2.	**Performance Monitoring** G Performance not monitored Frequency__________ Head differential______ N/A Remarks__________	Type of monitoring__________	G Evidence of breaching

IX. GROUNDWATER/SURFACE WATER REMEDIES G Applicable G N/A	
A. Groundwater Extraction Wells, Pumps, and Pipelines G Applicable G N/A	
1.	**Pumps, Wellhead Plumbing, and Electrical** G Good condition G All required wells located G Needs O&M G N/A Remarks
2.	**Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances** G Good condition G Needs O&M Remarks
3.	**Spare Parts and Equipment** G Readily available G Good condition G Requires upgrade G Needs to be provided Remarks
B. Surface Water Collection Structures, Pumps, and Pipelines G Applicable G N/A	
1.	**Collection Structures, Pumps, and Electrical** G Good condition G Needs O&M Remarks N/A
2.	**Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances** G Good condition G Needs O&M Remarks N/A

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3.	**Spare Parts and Equipment** G Readily available G Good condition G Requires upgrade G Needs to be provided Remarks N/A
C. Treatment System	G Applicable G N/A
1.	**Treatment Train** (Check components that apply) G Metals removal G Oil/water separation G Bioremediation G Air stripping G Carbon adsorbers G Filters G Additive (e.g., chelation agent, flocculent) G Others G Good condition G Needs O&M G Sampling ports properly marked and functional G Sampling/maintenance log displayed and up to date G Equipment properly identified G Quantity of groundwater treated annually G Quantity of surface water treated annually Remarks See Photos
2.	**Electrical Enclosures and Panels** (properly rated and functional) G N/A G Good condition G Needs O&M Remarks
3.	**Tanks, Vaults, Storage Vessels** G N/A G Good condition G Proper secondary containment G Needs O&M Remarks
4.	**Discharge Structure and Appurtenances** G N/A G Good condition G Needs O&M Remarks
5.	**Treatment Building(s)** G N/A G Good condition (esp. roof and doorways) G Needs repair G Chemicals and equipment properly stored Remarks
6.	**Monitoring Wells** (pump and treatment remedy) G Properly secured/locked G Functioning G Routinely sampled G Good condition G All required wells located G Needs O&M G N/A Remarks

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D. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)
G Properly secured/locked G Functioning G Routinely sampled G Good condition
G All required wells located G Needs O&M G N/A
Remarks

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

ALL REMEDIES FOR THE S.W. WETLAND AND THE ON-SITE CONTAMINATED SOIL & SEDIMENTS HAVE BEEN EXECUTED. CONSTRUCTION OF THE ON-SITE VAULT TO CONTAIN THE EXCAVATED WASTE WAS ALSO COMPLETED. THE ONLY ON-GOING REMEDIAL ACTION AT THE SITE INVOLVES REMEDIATION OF THE GROUNDWATER PLUME.

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

O&M Activities are being implemented AT THE SITE AND ARE ADEQUATE FOR THE LONG-TERM PROTECTIVENESS OF THE REMEDY.

C.	Early Indicators of Potential Remedy Failure
	Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future. DATA UNAVAILABLE
D.	**Opportunities for Optimization**
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. NONE DETERMINED DURING SITE VISIT.